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ABSTRACT

The Beginning Teacher Evaluation Study (BTES), Phase II, was a research project on effective teaching behavior--what teachers do that significantly affects what and how pupils learn. The purposes of Phase II were to (1) develop an assessment system for measuring teacher and pupil behaviors and other factors which could influence each of them and their interrelationships and (2) generate hypotheses about the interrelationships among teacher and pupil behaviors and related factors. Forty-one second grade and 54 fifth grade experienced teachers participated in the study. This volume presents the plan of the investigation, the research strategy, the rationale for the design, the tests and methods of their selection, and the major results of the study. Actual classroom teaching was observed; pupil performance was measured in reading and mathematics. Data were also gathered on correlates of pupil learning such as verbal aptitude, cognitive style, expectations for greater or lesser success in reading and mathematics, and indices of home and community variables. Data were collected on each teacher's background and measures were made of a variety of perceptual-cognitive aptitudes, knowledge of the subjects taught and how to teach them, attitudes toward these subjects, and the teachers' expectations for each of their pupil's performances. Data were also collected on the environment of teaching to determine if differences in the organization of instruction, shared responsibility for the design of the curriculum, administrative style, and organizational climate were related to differences in teacher performances. (RC)

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PR-76-6A

BEGINNING TEACHER EVALUATION STUDY
PHASE II 1973-74

FINAL REPORT

VOLUME I

THE EFFECTS OF TEACHING PERFORMANCE ON PUPIL LEARNING

BY

FREDERICK J. McDONALD

PATRICIA ELIAS

2

EDUCATIONAL TESTING SERVICE
PRINCETON, NEW JERSEY

BEGINNING TEACHER EVALUATION STUDY: PHASE II

FINAL REPORT: VOLUME I

THE EFFECTS OF TEACHING PERFORMANCES ON PUPIL LEARNING

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Frederick J. McDonald

Patricia J. Elias

Educational Testing Service
Princeton, New Jersey

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The Final Report of Phase II of the Beginning Teacher Evaluation Study has been prepared in five volumes.

Volume I

The Effects of Teaching Performances on Pupil Learning: The Major Results of Phase II of the Beginning Teacher Evaluation Study by Frederick J. McDonald and Patricia J. Elias. (Portions of Chapter 5 were written by Ruth B. Ekstrom and Meredith K. Stone; of Chapter 6 by Barbara Foltin and William Allen)

Volume II

Description of the Field Study and Sample by Patricia Wheeler

Volume III

The Observation Systems:

Chapter 1: APPLE Observational Variables and Their Relations to Reading and Mathematics Achievement by Nadine Lambert and Carolyn S. Hartsough

Chapter 2: Reading and Mathematics Observation System: Description and Analysis of Time Expenditures by Robert Calfee and Kathryn Hoover

Chapter 3: The Evaluation of Teaching Behavior Through Observation of Videotape Recordings by Jonathan Sandoval

Volume IV

Pupil and Teacher Tests by Ruth B. Ekstrom

Volume V

Special Studies:

Chapter 1: The Relationship of Teacher Aptitudes to Teaching Behavior by Ruth B. Ekstrom

Chapter 2: Teacher Expectations and Pupil Performance by Marlaine Lockheed

Chapter 3: Historical Data Study by Patricia Wheeler and Patricia J. Elias

Chapter 4: Reading Difficulties: Videotape Test of Teachers' Diagnostic Skills by Patricia J. Elias and Gail Hare

Chapter 5: The Reports of Teachers about Their Mathematics and Reading Instructional Activities by Patricia J. Elias, Gail Hare and Patricia Wheeler

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This report is dedicated to the teachers and principals who participated in this study. Without them the study could not have been done.

PREFACE

The Beginning Teacher Evaluation Study (BTES) is a long-term project of the California Commission for Teacher Preparation and Licensing. The second phase of this study was conducted by Educational Testing Service during 1973 and 1974.

Phase II was originally conceived of as a hypothesis-generating and instrument-development stage. Its goal was to develop a set of hypotheses derived from an investigation of teaching and learning which would be further tested and refined in subsequent phases. Instruments to measure a variety of factors were also to be developed in this process which could be used in the following stages.

This work began with the development of the plan and the design of a field study (Phase I), then went into a field-study whose purpose was to gather sufficient data to develop hypotheses about teaching and learning (Phase II), and then was to move to successive phases in which the hypothesis-pool was to be expanded and further tested. The ultimate goal is to produce empirically-grounded information about teaching which the California Commission can use to develop policies and standards for the education and licensing of teachers.

Phase II had originally been conceived of as a relatively simple field study in which a limited number of variables would be correlated in a regression analysis with measures of pupil learning. Educational Testing Service proposed a more complex design of this field study

during the contract-award phase. This design was considerably expanded after the contract award in consultation with and at the urging of National Institute of Education staff in the Division of Teaching, particularly on the part of Dr. Gary McDaniels who was then head of that section. The major additions made at that time were: (1) the addition of a study of the administrative climate of each school which would participate in the study; (2) an increase in the number of days of classroom observation; (3) the development of a comprehensive teacher-aptitude battery; (4) the development of a teacher test of diagnostic skills in reading; and, (5) a study of the past performances of pupils of the teachers who were to participate in the study.

Educational Testing Service staff met monthly with the Evaluation of Teaching Committee (as it was then called) of the Commission. During these meetings the details of the design were worked out. All aspects of the design were submitted to the Commission for approval. In the course of these meetings the project was further expanded. The consequence was that the Phase II design became a comprehensive multivariate design.

The contract for this study was awarded around July 1, 1973. The first few months were used to recruit participants and develop or select instruments for the initial testing of pupils and teachers. Eight school districts located throughout California agreed to participate in this study. Forty-one second-grade and 54 fifth-grade

teachers located in 43 schools participated in this study. Approximately 2700 pupils were tested both in the fall and spring of the 1973-74 school year. Two days of testing were used both in the fall and spring. Over 400 days of observation were allotted among the teachers and each was videotaped once.

Many different kinds of instruments and assessment procedures were used to assess pupil learning, teacher performance, and the background, aptitudes, cognitive style, attitudes and expectations of both pupils and teachers. Each principal was interviewed and principals and teachers provided information on the environment of teaching.

The result of this comprehensive data-gathering process is one of the most, if not the most, comprehensive set of data gathered on teachers and pupils. We regard one of our major contributions to have been the building of this data-set for research on teaching.

The academic year 1974-75 was used for data analysis. Many different procedures have been used and we regard the exploration of these methodologies as another contribution that we trust will be of value to other researchers. The report was reviewed by the Research Advisory Board of the Beginning Teacher Evaluation Study and other groups during 1975-76. Educational Testing Service also had the report reviewed by an independent internal group of researchers. We found the comments and suggestions of all these parties particularly helpful but we are solely responsible for the final document. We share any credit with the reviewers; if there are errors, they are ours.

We thought a study as comprehensive as this one deserved a complete report. We have tried to describe as completely as possible the details of the design and its logic, the instruments used, the data analysis procedures employed and the results. The full report therefore has been written in five volumes. The first volume is the major report of the project's results. Volume II describes the procedures used in the field study to gather the data and gives more details about the characteristics of the districts, teachers and pupils in the study. Volume III describes the two major observational systems used and the results of the videotaping of the teachers. First-stage analyses of these observational data are reported in this volume; descriptive statistics on the observed teaching performances are also provided there. Volume IV provides the details of the measurement system. Volume V is a set of special studies made in the course of the project--an analysis of the teacher aptitude battery and the relation of teacher aptitudes to teaching performances; an analysis of the teacher expectation data; the study of the previous performance of pupils of teachers in this study; the development and use of the diagnostic film test; and the development and use of the Work Diary, and the relation of variables derived from it to pupil performance. Volume I provides as much detail as necessary to understand the basic design and to interpret the results. The reader is referred at points to these other volumes for more detail.

This project could not have been completed without the assistance and cooperation of many individuals. The researchers who participated in the design, conduct, analysis of the data, and writing appear as authors. David Potter prepared a review of teacher research literature at an early stage and selected and analyzed the data from instruments used in the study of the administrative climate of the schools. William Allen was responsible for data analysis; Barbara Foltin programmed all data analysis in Princeton with assistance from Jan Allen. Allen Yates developed a procedure for and supervised the analysis of the reliabilities of the observational systems.

The field study was conducted through the Berkeley Office of Educational Testing Service under the direction of Patricia Elias, Patricia Wheeler and Robert Lambert. Their assistants were Mary Corder, Helga Grabske and Gail Hare. Mary Corder and Helga Grabske conducted the interviews of the principals. This Berkeley staff and their assistants were responsible for all aspects of the field-study. Without their work there would have been no data-base.

Richard Harsh of Education Testing Service, Los Angeles, supervised operations in southern California and was particularly helpful by encouraging the participation of districts in southern California. He was assisted by Gina Wilson (of Princeton) and Virginia Vandagriff of the Los Angeles Office.

Meredith Stone processed all data from the field and worked with Barbara Foltin to prepare it for data analysis. She also served as project manager in the Princeton Office and is responsible for numerous

progress reports to the Commission and careful editing of this report.

E. Leta Davis supervised the quality control procedures for coding and editing test data; supervised test coders; assisted in preparing reports providing descriptive statistics for the Commission; and proofread this volume.

Joanne Farr was secretary for the project in the Princeton Office. She typed all versions of the manuscript. She was assisted in the typing of the final version by Irma Kienitz. The Berkeley staff prepared several volumes of the final report in its different versions, and prepared much of the material presented to the Commission each month. While it is customary to acknowledge the help of the secretaries, we do so for more than the reasons of ordinary courtesy. All of them, particularly Joanne Farr, gave generously of their time and skill.

We also thank the school boards, superintendents and teacher representatives of the participating districts who extended themselves to support the project. Dr. J. Alden Vanderpool of the California Teachers Association was particularly helpful in recruiting participants.

We owe a special debt of gratitude to the teachers and principals who participated in this study. In the most fundamental sense, without them this project would not have been done. They have been tested and observed more than any group of teachers and principals who have participated in studies such as these. They were invariably courteous and tolerant. We consulted them about aspects of the project and their advice was most helpful. We hope that our work

has justified their cooperation. Because we owe them special recognition we have dedicated this volume to them.

The principal investigator for Educational Testing Service experesses his personal gratitude to Patricia Elias, Patricia Wheeler, Robert Lambert, Nadine Lambert, Carolyn Hartsough, Robert Calfee, Kathryn Hoover, Ruth Ekstrom, Jonathan Sandoval, William Allen, Barbara Foltin, Meredith Stone, Marlaine Lockheed, and Joanne Farr. This staff has been involved in various aspects of this project from the beginning and have worked together to bring it to its conclusion. He also expresses his particular gratitude to Patricia Elias who has been in every respect except title the codirector of this project.

Frederick J. McDonald

Patricia J. Elias

June, 1975
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BEGINNING TEACHER EVALUATION STUDY: PHASE II

FINAL REPORT: VOLUME I, CHAPTER 1

THE PLAN OF THE INVESTIGATION

INTRODUCTION

The study described in this report was complex because it involved the analysis of many different domains of variables, each measured by a variety of procedures. To facilitate the reader's understanding of the study the report is organized in five volumes. This first volume presents the plan of the investigation, the research strategy, the rationales for the design, the tests and methods of observation, the statistical techniques used and the rationale for their selection, and the major results of the study. At points in the presentation of these topics the reader is referred to other volumes in the report where the details relevant to a particular topic are given.

Volume II describes the field operations that were employed to gather the data. Volume III describes the observational systems used in live and videotaped observations of classrooms. Measurement procedures involving tests and questionnaires are described in Volume IV. Volume V reports special studies.

As much detail as we thought necessary for presenting the design, methodology, data analysis and major results has been presented in this volume. At various points the reader is referred to other volumes for more details, a complete report on the design and use of an instrument, special analyses that were made and other information that expands and compliments the material in this first volume.

The Context of the Study

This study was conducted under the direction of the California Commission for Teacher Preparation and Licensing and was funded by the National Institue of Education. It is the second stage in a larger design. The goals of this long-term study are to develop and test hypotheses about the relations of teaching to learning and to sharpen the delineation of policy alternatives about the selection and training of teachers. The data collected through this sequence of successive research studies will be used to formulate policies and standards for the preparation and licensing of teachers in California. The research is therefore directed to generating data which will help the Commission develop these policies and standards.

This phase, Phase II, was specifically designed to estimate the likelihood that certain policy alternatives would be worth considering and to generate hypotheses about the relation of teaching to learning. The design of this phase was constructed to achieve these goals, and is as a consequence a study with many facets. The information gathered was also to be used to design replications of this study; therefore, a number of procedures, both methodological and analytic, were used to test ideas and methods that might be fruitful in subsequent phases. The recommendations presented at the end of this volume summarize both what has been learned about teaching and learning in this phase and our perceptions of some directions for the subsequent phases.

Estimating Teacher Effects

A major goal was to estimate the effects of teachers' actions or teaching performances on pupil learning. The assumption was made that differences among teachers in how they organize instruction, in the methods and materials they use, and in how they interact with pupils would have different effects on how much children learned. The central component of the study was therefore the measurement of pupil learning and of teaching performances. Experienced teachers were observed several times and these observations were organized into scores which represented differences in teaching actions or performances. At the beginning and the end of the school year, pupils' learning was measured in reading and mathematics. The major analyses of this study were of the relations of the scores representing the differences in teaching performances to differences in pupil learning.[1] Multivariate techniques were used in these analyses. The results of the analyses have been used to generate hypotheses about the relation of teaching to learning. An observed relation is presented as a hypothesis to be tested in subsequent phases of the research. A summary of the results of these analyses and the hypotheses are presented in Chapter 10 of this volume.

The Policy Questions

At the beginning of this study the California Commission had thought of several policy alternatives that they knew they could consider.

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[1] These differences were represented in two kinds of scores, residual and mean difference scores. Both kinds of scores were used to see if different teaching performances were related to the different scores. Although mean difference scores are less reliable than the original scores, we were interested in seeing how teaching performances related to them.

They had been given the legal power to set standards for the education of teachers. Such standards might be set for two major aspects of this education--what a teacher should know and what a teacher should be able to do. The policy issue is the relative emphasis to be given and the level of competence to be achieved in these two components of the education program preceding the initial certification of teachers. The research question relevant to this policy issue is, what are the relations among knowledge of what is to be taught, knowledge of how to teach it, performance in teaching a subject and how much pupils learn? This study was designed to estimate the relative influence of these kinds of factors on pupil learning.

A second policy issue relates to the emphasis that might be given to the selection of prospective teachers. If certain characteristics or aptitudes were found to be associated with more effective teaching, a case might be made for a program of selective admissions. Or, the design of programs might be changed to adapt them to differences in characteristics and aptitudes of students admitted to teacher education programs. The research question underlying these policy alternatives is, what is the relation of different teacher characteristics and aptitudes to differences in teacher performance and pupil learning? This study was designed to estimate these relations.

Related Questions

Two categories of questions needed to be studied to provide answers to the questions of major interest. The first of these is how much the characteristics of pupils independently account for

differences in their learning. The second is to estimate how much differences in the environment of teaching account for differences in teaching performances.

To explore these relations a variety of pupil characteristics were measured such as their socioeconomic status, expectations, attitudes, aptitude and cognitive style. To estimate the effects of the environment of teaching on teaching performances, the administrative style of principals and organization of the schools were studied. Such aspects of the school were measured as how the teachers were organized for instruction, the kinds of processes used in making decisions about the curriculum and instructional methods, the teachers' and principals' perceptions of their working relations, and the teachers' satisfaction with and aspirations for their teaching.

This study was multivariate in design. Seventeen domains of variables were measured and multiple measurements were made in each domain. Two major kinds of analyses of these data are presented in this volume. The relations between teaching performance and pupil learning were analyzed by using multiple and stepwise regressions of pupil scores on teaching performances. The results of these analyses are presented in Chapters 7 and 8. To explore the policy questions, the relations among all the domains of variables were analyzed by the technique of path analysis. The results of this analysis are presented in Chapter 9.

The Methodology of the Study

This study was conducted "in the field." Actual classroom teaching was observed; pupil performance was measured in reading and mathematics on two occasions, fall and spring. These two sets of data were used to study the relations between teaching performances and pupil learning.

Data were also gathered on the correlates of pupil learning such as each pupil's verbal aptitude, cognitive style, and expectations for greater or lesser success in reading and mathematics, and indices of home and community variables. To study the correlates of differences in teaching performances, data were collected on each teacher's background and measures were made of a variety of perceptual-cognitive aptitudes, knowledge of the subjects taught and how to teach them, attitudes towards these subjects, and the teachers' expectations for each of their pupil's performances. Data were also collected on the environment of teaching to determine if differences in the organization of instruction, shared responsibility for the design of the curriculum, administrative style and organizational climate were related to differences in teacher performances.

The Measurement of Pupil Learning

The choice of the dependent variables, the areas in which pupil learning was measured, was made by the California Commission for Teacher Preparation and Licensing. The subjects chosen were reading

and mathematics in the second and fifth grades. The major areas of the reading curriculum to be measured were decoding skills, reading comprehension, reading applications and attitudes toward reading. The major areas of the mathematics curriculum to be measured were computation skills, concepts, applications and attitudes toward mathematics. The objectives of the State of California were used to define the components of each of these areas and tests were built to measure pupil performance with respect to these objectives. These measures are therefore domain-referenced; test items were designed so that the tests were also objective-referenced.

The Measurement of Teacher Performance

Teachers were observed on no less than two occasions. The available observation days, however, were distributed so that estimates could be made of the reliabilities for different occasions of observation, for differences across teachers and for differences among observers. The test of the reliability of the observational system was made by using a nested design with observers nested within occasions and observers and occasions nested within teachers.

A survey of previous research supported the belief that there was not sufficient evidence to select in advance particular aspects of teaching performance to be observed. This conclusion led to another--that the use of many of the available observation instruments would limit the number of facets of teaching performance that would be observed. Two systems which did not have these limitations were

used. One system (APPLE) provided continuous behavioral recordings which were subsequently coded. The other system (RAMOS) provided continuous recordings in categories. These categories had, however, been developed prior to this study by intensive and daily observations of teachers and were descriptors of the range of events readily observable in an elementary classroom.

Both systems provided data on the teaching context (how pupils were organized for instruction), teacher activity (instructional methods), pupil activity, the materials of instruction, the content of instruction and the teacher-pupil interactions. The systems had been designed and were used to develop as complete a picture as possible of the minute-by-minute activity in each classroom.

Two other kinds of data on teachers' performances were collected. Each teacher on two occasions completed a Work Diary. In this diary the teacher recorded his or her goals and specific objectives for the week in which the recordings were made, the materials and content of instruction, and the teaching strategies being used. Each teacher was also videotaped on one occasion and a subset of ten teachers taped on four occasions. These data were collected for two purposes: (1) to compare the observations made by using the videorecorder with the live observations; and (2) to estimate the consistency in teacher performance across time.

Chapter 4 of this volume describes the concepts of measurement used to design the observational system, how variables were developed from the original data, the methods of scoring and the reliabilities

of the systems. Volume III describes each system in detail and the analyses made originally with the data from each system (APPLE, RAMOS, and videotapes). Volume V, Chapter 5, describes the Work Diary instrument and the analyses made with the original data collected with this instrument.

The Measurement of Teachers' and Pupils' Characteristics

Data on teachers' and pupils' characteristics were collected in several ways. Tests of aptitudes, cognitive style and attitudes were administered to both groups. The teachers' knowledge of each subject and how to teach it was also measured. Each teacher described how he or she thought each pupil in the class would perform in reading and mathematics that year. Each pupil also described how he or she would do that year in reading and mathematics.

Each child's parents responded to a questionnaire in which they described characteristics of the child's background such as their education. The parents also described the child's reading activities outside of school. The teacher, using school records, filled in a questionnaire on each pupil describing his or her family background and previous school experience. Each teacher also filled in a questionnaire on his or her background, educational and teaching experience, satisfaction with teaching, aspirations in teaching, and described the kinds of pupils they preferred teaching and the kinds of schools and communities in which they preferred to teach.

Chapters V and VI of this volume describe how these data were used for this report. Volume IV provides the complete description of these measures.

The Measurement of the Environment of Teaching

The principal of each school in which this study was conducted was interviewed at length. During this interview the principal described his or her educational goals, the organization of instruction in the school, the school's programs and curricula in reading and mathematics, how curriculum decisions were made, how he or she evaluated programs and teachers and the independence and self-direction encouraged among teachers and pupils. The principal also filled out a questionnaire on his or her administrative style.

The teachers also described how decisions were made in the school and how much independence and self-direction they encouraged among pupils. They also filled out a questionnaire on the principal's administrative style. Chapters 5 and 6 of this volume describe how these data were used for this study and Volume IV describes the details of the measures used.

The Sample of Teachers and Schools

Through a process described in Chapter 6, eight school districts were selected which were willing to participate in this study (see also Volume II for information on the sample). Two urban, three suburban and three rural districts agreed to participate. Four were located in northern California and four in sourthern California.

A total of 43 elementary schools agreed to participate. Forty-one second-grade teachers and 54 fifth-grade teachers in these schools volunteered to participate (97 teachers started in the study but two were assigned to other duties during the year).

Because it is virtually impossible to obtain a completely random sample of teachers in a study of this kind, the sample of teachers is a volunteer sample. But for the purposes of this study the participating sample was sufficient. It was not the purpose of this study to generalize about teachers or California teachers. The goal was to find differences in teaching performances related to differences in pupil achievement. Any sample of teachers in which such differences were found was sufficient for a first-stage development of hypotheses about teaching and learning. Later stages of the Beginning Teacher Evaluation Study will attempt to replicate the findings of this phase.

The sample of participants was limited to experienced teachers to increase the possibility of finding differences in teaching performance associated with differences in learning. This limitation was imposed so that teachers would be observed whose teaching style had stabilized. These teachers were also adept at classroom management. As a consequence no classes were observed that were unruly or disorganized. Thus, the extremes of ineffectiveness do not appear in the observational data.

An analysis of the characteristics of the sample revealed no differences in major characteristics (experience, education, and

so forth) between this group and California teachers. From such data as well as the observational data we have concluded that we observed a sample of teachers and pupils much like those typically found in California schools with the exception that we do not have in the sample teachers who cannot manage a class. This is not a serious deficiency for this study, the purpose of which was to study the effects of instructional performances. Later phases of the Beginning Teacher Evaluation Study will show whether the performances found effective in this study are unique to this sample of teachers.

The Analytic Strategy

At the beginning of this chapter we stated that two major categories of questions were the foci of analysis. The first of these was, which teaching performances are substantially associated with differences in pupil achievement? Two analytic strategies were used to provide answers to this question.

The design included pretest and posttest measures of pupil performance in reading and mathematics. The differences in performance between these two occasions were translated into two kinds of scores, residual and mean difference scores. These scores were regressed on measures of teaching performances. Both multiple and stepwise regressions were used for this purpose. The results of these analyses are presented in Chapter 7. These procedures tell us which teaching performances predict the differences in residual and mean difference scores.

A more interesting and potentially more fruitful strategy emerged when spring scores were regressed on fall scores using class means. In this analysis teachers, represented by fall and spring means, will be located around the regression line. Some will be outliers, and those of interest will be the ones with positive and significant residuals. A discriminant analysis can be performed to find the teaching performances which distinguish the group with positive and significant residuals from other teachers. Originally this was the analysis planned.

But as the first step in this analysis, regressions of spring scores on fall scores were performed by class. This analysis revealed that the slopes of the regression lines of the classes were not parallel. They fell into three groups. A regression of scores representing these differences in slopes on teaching performances identified the teaching performances which distinguished the groups. The results of these analyses are presented in Chapter 8.

The results have two major implications, one technical, one conceptual. Multiple and stepwise regressions of achievement scores on teaching performance scores will conceal the interaction between teaching performances and achievement when differences in the slopes of regression lines among classes are substantial. Also it seems that there are different kinds of teaching effectiveness, each defined by a different kind of pupil effect. The consequences of such differences in effects will be needed to be studied before such concepts as "teaching effectiveness" or "teaching competence" can be given empirical meaning.

The other major category of questions to be explored in this study were those called "policy questions." The data on pupil, teacher and the environment of teaching characteristics were gathered to find if relations appeared among these variables and teaching performances and pupil learning. Such analyses might indicate what policy alternatives regarding the selection and training of teachers would be worth considering for further study.

To estimate the relative influence of these factors on teaching and learning it was necessary to estimate the interdependencies among these variables. Because the set of all variables are intercorrelated to various degrees, a method was required that would use all of the data to make inferences about dependencies among the variables. The technique of path analysis was used for this purpose. To use this technique a structural model of relations must first be postulated. The model used in this study is described in Chapters 2 and 3 of this volume. The results of the path analysis are presented in Chapter 9.

Critical Features of this Study

There are several features of this study to which the reader should be alerted and which should be remembered in interpreting its conclusions.

1. The measures of pupil achievement are reliable; they are domain and objective-referenced. No pretense is made, however, that all the effects of teaching were measured

in this study. The study was limited to finding the relations between teaching performances and learning in the areas selected by the California Commission for Teacher Preparation and Licensing.

2. The sample of teachers is limited to volunteer participants who were experienced teachers in elementary schools in California. The districts which participated were selected to represent a range of characteristics presumably related to differences in educational resources and practices. An analysis of the sample's characteristics revealed no major differences between the teachers in this study and those of California teachers.

But conclusions cannot legitimately be made from the data about teachers in general, California teachers, or all of the teachers in in the schools and districts represented in this study. This limitation is important to remember when reading descriptive statistics, particularly those about teaching performances.

These limitations do not mitigate against the validity of this study. They restrict the kinds of conclusions that can be drawn from it. The study did achieve its major purpose which was to find differences in teaching performances associated with differences in pupil learning. Substantial relations also were found among the pupil, teacher and the environment of teaching characteristics and teaching performances. Subsequent phases of the Beginning Teacher Evaluation Study will determine whether such relations are unique to this sample of teachers and schools.

There are several features of this study which are worth noting because they present a somewhat different picture of teaching performances and their relations to learning than appears in previous research:

1. The sample of observational data is different than that gathered in many previous studies. The data were comprehensive in scope. The data were recorded continuously rather than in time-samples.

   The consequences for data analysis were that ways had to be found to reduce the number of variables to be used in the analyses. Several procedures have been tried for this purpose and will be described in this volume. The results described here pertain to the way in which teaching performances were organized in this first analysis of the data.

2. At any level of organization of the observational data it was apparent that teaching performance variables were intercorrelated in varying degrees. Teaching performances cannot be treated as isolated or independent behaviors; they are clusters of interdependent behaviors. A new conceptualization of performances is needed which describes the multiple facets of teaching events. We have made a first step in that direction and on the basis of our experience have proposed in Chapter 10 a number of other ways of organizing teaching performances that may also be revealing.

For the purposes of understanding the effects of teaching performances it makes no sense to study variables one at a time. While this step is useful to the investigator to understand the structure of the performance domain, it is misleading to describe the results of studies like this one in terms of the zero-order correlations of teaching performances with pupil achievement scores. Therefore, we have used multiple-regression methods to study these relations. We think that the relation of performances to outcomes can be stated best in terms of multiple-regression equations.

3. The regression analyses of outcome scores on teaching performances have been performed by class. We think that this is the first instance of such an analysis in the literature. What many have suspected is the case in the data in this study. The slopes of the regression lines of the classes are not parallel. This means that pupil performance effects by class are quite different. In this study differences in teaching performances account almost entirely for these differences by class in pupil achievement.

There is no way of knowing from this study how stable or characteristic such differences in pupil effects are. But even if relatively few such differences were found

across a large sample of teachers, the fact of such differences is important for the research that should be done on teaching.

4. The path analysis technique is one of several similar techniques that might be used to analyze a complex set of data. The fact that it has been used for the first time on teacher data is important because the results clearly illustrate what most practitioners believe--that the relations of pupil, teacher and school characteristics to teaching performances and to learning are complex. But they are not uninterpretable.

This study has produced provisional answers to the many questions it attempted to answer. We have tried to use a design and methodology appropriate to the complexity of the world of teaching within the inevitable constraints of time and money. The results reported here are a first foray into a very complex data set. The results are reported with the necessary cautions but we trust that the value of having made this attempt to move research on teaching into the world of multivariate analysis will be recognized.

Generating Hypotheses about the Effects of Teaching

A distinction should be made between hypothesis-testing studies and hypothesis-generating studies. In the first, a set of hypotheses may be stipulated in advance and an appropriate experimental design

selected to test these hypotheses. The other approach is to create a representative set of the variables believed to be related to a set of dependent variables such as children's learning, then select a design appropriate for estimating the relationships believed to exist among these variables, and on the basis of these estimates formulate a set of hypotheses.

The choice between these two methods depends in part on the state of knowledge in the domain of investigation. Where significant theories have been developed which embrace a variety of hypotheses and from which other hypotheses may be derived, the hypothesis-testing approach is the one that ought to be followed. In a domain of investigation where there are no theories or only weak theories, and where the number of tested hypotheses is limited, the second approach is probably better, because the problem is to increase the pool of hypotheses from which higher-order theoretical constructs and theories and models may be constructed. Recent reports suggest that the analysis of teaching behavior and its consequences falls in this second category (Rosenshine, 1971; Dunkin and Biddle, 1974). For this reason we have constructed a plan of investigation which stipulates a domain of variables which must be sampled if the relationships between teaching performances and children's learning are to be studied. Multivariate techniques were used to estimate dependencies among these domains.

The design is representative of the domain of variables in the Brunswickian sense (Brunswick, 1952). This representative sample of the domains of variables is organized as a possible structure of interrelationships among the domains which is to be verified by the

analysis of the data. Significant relations found in this network are the basis for inducing hypotheses.

This approach requires a multivariate experimental design.[2] To explain a multivariate design, three major topics will be discussed. (1) As the term "multivariate" suggests, the design includes a number of variables. A structure depicting the interrelations of these variables should be delineated and the reasons for their selections given. (2) The appropriateness of the design for testing the relations among these variables should be explained. (3) The choice of methods of data-gathering and statistical analysis should be discussed.

This volume is roughly divided into two sections. The first section (Chapters 2-6) treats these three major topics. The second section (Chapters 7-10) presents the results of the investigation.

A Plan of An Investigation

Cattell presents a diagram of the major components of a scientific investigation and their interdependencies (1966, p. 52). We have reproduced that diagram in Figure 1.1. The diagram will serve the reader as an organizational device for the major topics discussed

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[2]The word "experimental" in this context is used in the sense that Cattell used the term; that is, a design from which causal inferences may be made. A contrasting and more limited meaning of "experimental design" is probably more familiar to some readers. This limited sense of "experimental design" refers to those instances of "experimental design" in which independent variables are manipulated. The study described here does not manipulate independent variables; however, variation in these variables occurs in a time sequence with respect to each other so that causal inferences may be made about the relationships among the variables. These inferences must, of course, be tested by factorial experimental methods. (Cattell, 1966, pp. 19-21).

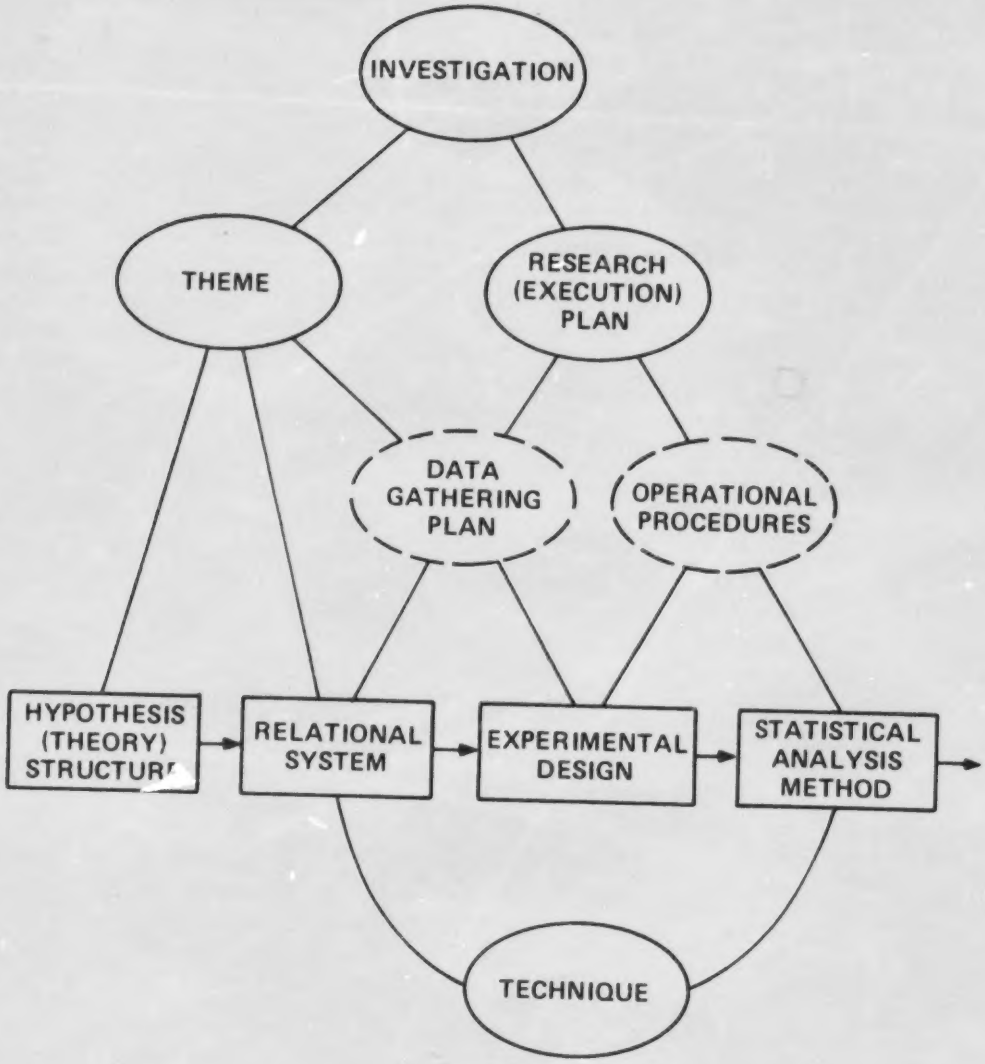

Figure 1.1. A Paradigm of the Components of a Research Study

in this chapter, and will show the sequence of steps involved in making choices about the design and the statistical techniques to be used.

Investigation is the most abstract of all of the constructs in the figure. Investigation denotes the domain of research. In this case, the domain of research is children's learning. The central question in this domain is, what variables influence children's learning? There are of course a large number of such variables which are believed to influence children's learning. Among these are factors in the early development of the child; his or her aptitudes; the background conditions that interact with the conditions of schooling; the conditions of schooling themselves, such as the curriculum and materials of instruction; and the actions of teachers who mediate instruction.

Theme refers to the major area of hypotheses to be investigated within the domain. In this study, the theme is the potential set of hypotheses about the relations of teaching performances to children's learning. The theme is further qualified by restricting the range of phenomena embraced under the term children's learning. In this study, children's learning refers to learning to read, learning certain mathematical concepts and skills, and developing positive attitudes towards reading and mathematics.

The theme of the investigation is broadly stated; it restricts the investigation to a particular set of variables within a broader domain and stipulates the critical or focal questions of investigation. The reader will find, for example, that although this study investigates the relations between the characteristics of the children's homes and

their aptitudes for learning, such relations are not the focal questions under investigation. They are studied as part of a more comprehensive analysis of all of the factors impinging on student learning, so that the relative influence of teaching performance on learning may be more accurately estimated.

Ease of understanding of the concept presented in Figure 1.1 will be facilitated by continuing down the left-hand side of the diagram and across the bottom row. The box containing the words "hypothesis" (theory/structure) refers to a further specification of the relationships to be investigated in the study. One has the choice of stipulating a set of hypotheses, or a network of hypotheses formulated in a theory, or a structure of potential relations. We indicated above that the present state of theory development and hypothesis formulation in research on teaching is limited. Therefore, what this study investigates is a structure of potential relations among domians of variables thought to be a representative sample of the domains of variables which describe how teaching performances and children's learning are believed to be related.

What is the difference between specifying a structure of potential relations and specifying a set of hypotheses? Each domain in the structure is an abstract construct. Each domain must be specified by measures which are operational definitions of the construct. Thus, there are as many operational definitions of teacher aptitude as there are measures of aptitude. But we do not know if they are all highly related or if there are several different domains of aptitude.

An investigator could make a hypothesis about verbal aptitude, teaching performances and verbal learning. The hypothesis would be tested by using specific measures of each construct. Another hypothesis could be made about another aptitude, and so on.

At this stage of research on teaching we think generating and testing hypotheses in this way is inefficient. For the most part ideas about correlates of teaching and about teaching performances are constructs denoting domains in which many different measures may be made. We think that most statements about teaching describe relations among these domains rather than hypotheses relating specific measures of variables to each other.

In this study we have stated how we think domains of variables are related and have made multiple measurements in each domain. If many measurements in one domain predict the measurements made in another domain, we are reasonably certain that we are interrelating constructs which are homogeneous in themselves. Knowing this, we can then define a construct more precisely by interrelating its measures, and then specify the variables which define the construct. After that hypotheses may be tested which use operational descriptions of the variables.

This approach contrasts with one in which a general construct is interpreted by a simple measure. Tests with single measures tell us little about the constructs or variables of which the single measure is as assumed instance.

The reader should note that the investigators have made a critical choice in the plan of the investigation. We are not investigating hypotheses about teaching and learning which have been stipulated in advance. Nor are we investigating a particular theory of instruction or teaching. We are investigating the relations in a domain of variables, each of which is thought to be related to teaching performances or children's learning and in some instances to each other. An elaboration and explanation of the rationale for this structure will be presented later in Chapter 3.

The box labeled "relational system" refers to the types of data or data-sets which are chosen to analyze relations among constructs. Figure 1.2 presents a simplified version of a more complex model of a data matrix or covariation chart (Cattell, 1966, p. 69). The model stipulates that there are three major sources of data available, a data-set gathered on persons, a data-set gathered on situations/responses, and a data-set gathered on conditions.

The term "persons" in this context is used in its ordinary sense. A data-set on persons is information that describes the variation in the kinds of persons who are participating in a particular study. "Persons" in this study are teachers and pupils. They are described in a number of different ways. The axis, "situation/response," refers to information gathered on responses made by individuals in particular types of situations. "Situations/responses" in this study are what different teachers do in their classes and what pupils do in the varied learning situations which teachers create for them. "Conditions" represent variations in the situations/

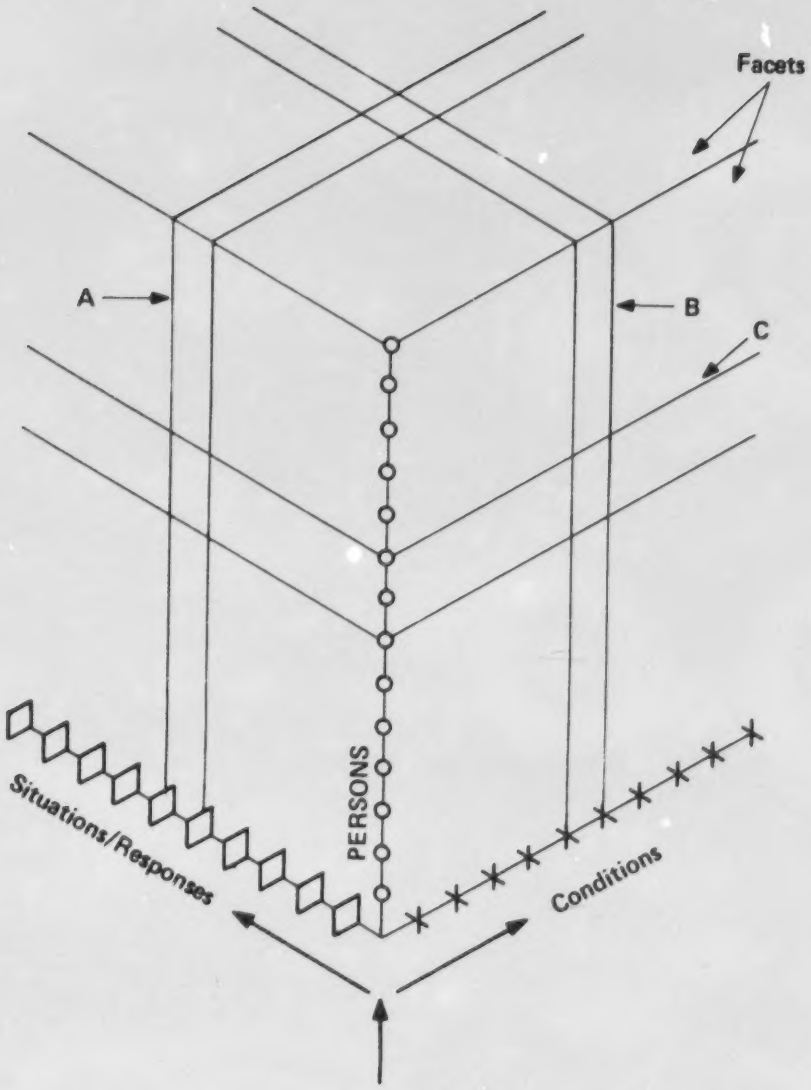

Figure 1.2. The Principal Dimensions of a Data-Matrix for a Multivariate Study

*If a "cut" is made in the data, such as at A, then the data-set is a persons X conditions set. If a cut is made as at B, then the data-set is a persons X situations/responses set. If a cut is made at C, the data set is conditions X situations/responses. Thus any data-set built around the three dimensions may be analyzed in terms of these three facets.

responses in which the persons are responding and includes present and prior conditions and internal and external conditions. "Conditions" in this study are the variations in classes defined by differences in pupils' aptitudes, background, and similar factors. They are also differences in the environment of teaching such as differences across schools in how the staff is organized for instruction. The investigator in constructing the investigation plan must select along which axes he or she is going to gather data in order to test the hypotheses, or, in the case of this study, to estimate the dependencies among the domains of variables in the hypothesized structure.

The data-sets represent the concrete empirical embodiments of the constructs and their relations. In this study, for example, characteristics of persons, in one instance, children, describe the variation along the persons dimension; similarly, characteristics of teachers describe the variation among teachers. (Characteristics here embrace age, sex and similar characteristics, variables such as expectations about performance and trait variables such as aptitudes.) Situations/responses in this study are the measures of pupil learning and pupil behavior in the classroom. The design of the study also permits viewing teacher performances as a set of dependent variables, which are sorted as situations/responses and whose variation is related to characteristics of persons (teachers) and conditions of teaching. Conditions represent general conditions, present or prior, on which data are gathered to estimate their influence

on persons responding in situations. In this study conditions refer to, for example, the socioeconomic background of the child, or the organizational structure of the school in which the teacher is teaching.

It is important to keep in mind that the focal question in this study is the relationship between teacher performances and children's learning. As the reader will see in a model presented in a later chapter, these two domains of variables are embedded in a representative structure of domains of variables. It is possible to treat the teacher performances as a dependent variable within this structure in order to estimate what kinds of variables influence variation in teaching performances. But the variations in teaching performances are the set of independent variables of primary interest in relation to children's learning. Referring to the covariation chart in Figure 1.2, in one instance persons refers to children and the other two axes describe the domains of variables specifically related to their learning. In the second instance, the person-axis refers to teachers, and the other two axes refer to domains of variables influencing teachers.

The structure, however, is analyzed in its totality. But for the purposes of greater understanding of the structure, the two major components, one related to teacher performances, the other to children's learning, will on occasion be pulled out of the structure and looked at independently when we are discussing the results of this study.

We note here the major characteristics along these dimensions of the study being reported; these dimensions will be discussed in greater detail in the chapter on experimental design. This study has the following characteristics:

1. It is multivariate both in the independent and dependent variables.
2. Variables have not been manipulated in the experimental sense, only in the sense that prior events are antecedent in time to the dependent variables. Some of the variables in this study occur prior in time to other variables. Therefore, causal inferences may be made about the relationships among these variables. But the kinds of inferences made cannot have the same rigor as would be the case if variables had been manipulated.
3. The degree of situational control in this study is probably sufficient but difficult to estimate as a proportion of the variables measured to the potentially measurable variables. Numerous situational variables have been measured such as a variety of background characteristics of teachers and pupils, and characteristics of their schools and communities. We believe we have measured a significant number of such situational variables so that we can estimate important sources of variance in the independent and dependent variables.
4. The design is a representative sample of the domain of variables in a structure of variables related to teaching

performance and student learning. The case for the representativeness of this design will be presented in Chapter 3.

5. The design may not include a representative sample of teachers and students, or of larger entities such as schools and districts. They are not representative in the sense that a random selection of teachers, students, schools, and districts was made. Districts, schools, and teachers participate in these types of studies on a volunteer basis. Volunteer samples are a fact of life in research on teaching when that research is being conducted in actual school settings.

We will explain the general procedures for sampling and provide data on the characteristics of the sample from which the reader may make his or her own judgment about the biases in the sample. It is our belief that the sample is like a truly representative sample in some major dimensions; in others it may be biased, and certainly is so to the degree that volunteering produces a sample of teachers who may be more or less effective.

We are not convinced that volunteering produced a sample so biased that conclusions could not be drawn about differential effects of teaching performances. What is more likely is that differential effects were underestimated because volunteers were not likely to

> be highly ineffective. In a sampling sense the sample is biased by its volunteer character. Differences found among teachers are differences among a group of teachers who are probably effective. They are therefore all the more remarkable both for theoretical and practical purposes.

Our design may be described as a correlational or multiple regression design, from which the implication could be drawn that essentially the only information that could be generated is estimates of associations among variables. Such terms label the statistical techniques typically used in the type of design employed in Phase II. They do not, however, portray the nature of the design and its power to test inferences.

We already know that many of the measurements made in this study will covary. Simply to correlate a new set of these measures was unlikely to advance our knowledge. What is different about this study is that the domains of variables have been chosen to represent phenomena which can be conceived of as antecedents of other phenomena. Social circumstance provides that students have different teachers. The variation among teachers may be looked upon as a natural experiment in which one may make causal inferences about the effects of this variation on children's learning. Children have lived in communities which differ in social and educational values and in economic resources. By selecting a variety of such communities the investigators have "manipulated" these situational factors in measurable ways.

Also measurements were made so that it was reasonable to infer that one domain of phenomena was antecedent to another if a correlation

was found between them. Then partial correlation methods were used to estimate the amount and direction of "causal' influences; for example, teachers' aptitudes and knowledge were measured. It is reasonable to assume that these are characteristics which are antecedent to observed teaching performances. If a relation is found between them and performance, it is also reasonable to infer that they may act as "causes" of teacher performance.

The power of the design therefore consists in the array of domains of variables included, the ways in which they were measured, and the multivariate techniques used to analyze the relations among the domains.

The choice of a research design depends upon a variety of factors, the most important of which is the state of knowledge in a field. In a field where hypotheses are weak and theories are meager, one can proceed by using factorial experiments to test specific hypotheses; however, such a strategy is somewhat wasteful when the elegance of the experimental design and the precision of statistical analyses exceed the sophistication and explication of the theory or hypotheses being tested or the precision of the concepts describing variables. Also many variables of educational significance cannot be manipulated experimentally. A multivariate experimental design of the kind described in this study is a very useful first phase in the development of more refined hypotheses which can be tested subsequently in factorial experiments.

This study has limitations. The data have been gathered on a limited sample of teachers and children and a limited sample of school and community conditions. All of the results obtained in this study may not hold up in a replication of it. Studies of this kind should be replicated, but that recommendation is not based upon their multivariate character or the fact that variables are not manipulated in the factorial experimental design sense of the word. All experiments, naturalistic or laboratory, should be repeated.

Multivariate designs, however, are limited in their usefulness for making causal inferences. The relative lack of control over potential antecedents of a dependent variable weakens the strength of a causal inference. Nevertheless, such designs provide a useful way of identifying "likely bets" for tightly controlled experiments in which only one or a few variables are varied systematically to measure their effects. They also provide inferences about the effects of variables that cannot be manipulated.

Return to Figure 1.1 Statistical Analysis Method is the last set of choices that the investigator must make in order to complete the basic plan for the investigation. Statistical Analysis Method means methods of summarizing and organizing data to make, among other things, tests of the fit of mathematical models. In this study the principal statistical procedures used are correlational analysis; multivariate regression analysis and its variations such as path analysis; factor analysis; and appropriate tests of statistical significance. The details of the specific techniques and the reasons for the choices of these techniques are provided in Chapter 6 on Design and Data Analysis.

If the reader will again return to Figure 1.1, we will complete our explanation of this figure. The ovals in the diagram (which have not been explained to this point) represent aggregations of other components in the plan of investigation. The "data-gathering" plan, for example, combines the design which determines how the data are gathered and the relational system which determines what data will be gathered (see Chapters 2-6). Similarly, the "operational procedure" category is the combination of the design and the statistical analysis methods (see Chapters 5 and 6). The design determines what type of operational procedures can be used in analysis and sets limits on the use of the analytic methods and their interpretations. The data-gathering plan and the operational procedures together constitute what is usually called the research plan. Statistical Analysis Method combines the relational system which is the measurement system and the methods used to analyze the data gathered in the relational system.

Thus, the reader who is interested in the measurement system is thinking about what in this diagram is called the relational system. That system is described in Chapters 4, 5 and 6. The reader interested in design and data analysis is referred to Chapters 2, 3 and 6. By reading Chapters 2-6, the reader has the basic concepts and methods used in this study, the research plan. The structure which will be the basis for inducing hypotheses about relations among domains of variables is described in Chapters 2 and 3.

Now that the reader has familiarized himself or herself with the general plan of investigation, we will illustrate where this type of multivariate study fits into a larger scheme of research on teaching. Figure 1.3 presents a schematization of phases of research beginning with observations and running through hypotheses which are tested in tightly controlled situations (Cattell, 1966, p. 16). The sequence of events is drawn as a spiral to suggest that the general steps seldom proceed in a linear fashion and also to imply that spirals within spirals and offshoots from the main branches could also be drawn.

Since this study is a multivariate observation on teaching performances and children's learning, it is properly placed at the bottom of the spiral. Analysis will lead to inductions about "regularities" in the observations which will lead to hypotheses about this relation.

It should be emphasized that the inductive reasoning in this study is a process which begins by postulating a structure of variables related to teaching performances and children's learning, and proceeds to an estimate of the validity of that structure. The statistical tests used are ways of estimating the degree to which the observed data can be explained by the structure. The hypotheses that result are statements about relations which appear to be substantial, given the general validity of the structure.

The availability of a data-base containing observations and measurements of a variety of variables aggregated in domains will allow for two subsequent analytic strategies. One may reconceptualize

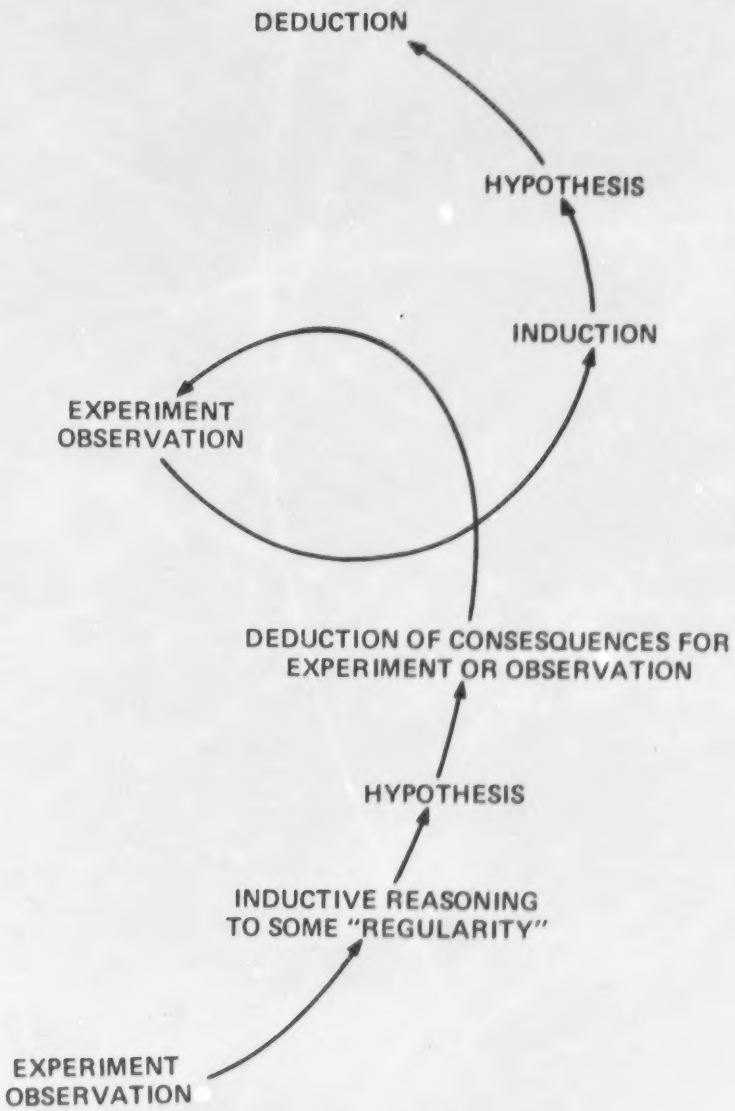

Figure 1.3. A Visual Representation of the Hypothetical Deductive Method of Research

the variables within domains or reorganize the variables into different domains by reconceptualizing their meaning. While such redefinitions and reorganizations are legitimate as part of the process of inductive reasoning, strictly speaking the investigator should be required to specify in advance the representative sample of the domain of variables, the variables within the domains and the methods for measuring them. Otherwise the investigator assumes the burden of arguing and demonstrating that the data already collected can be organized into other and different representative samples of the domains. This remark is cautionary; we do not mean to imply that such arguments cannot be made or if made would be untenable.

The other possibility is that the structure itself can be reorganized by postulating other kinds of causal relations. The structure presented here rests upon known facts such as the priority in time of certain events, empirical data about relations, and logical reasoning about potential relations. Other conceptualizations are possible. The data-base may be useful for testing these other structural models and different hypotheses may be derived from them. Using the data-base to test other models is a way of finding better ways "to fit" the data already gathered. It is not a way of testing the validity of the conclusions from the original or new models. All these conclusions' validity should be tested by a replication of the study.

The goal of the study is to generate as many hypotheses as may be legitimately derived from the data. The following quotation summarizes the spirit of this study:

> "The infant mortality of generated hypotheses is thus very high indeed. The vitality of science....is not great when there is too much fond concentration on 'only' children. Consequently it is good for scientists to 'spread' attacks and to revert constantly and vigilantly to the data itself, to catch the last hint....of what new hypotheses may better fit the data." (Cattell, 1966, p. 17).

BEGINNING TEACHER EVALUATION STUDY: PHASE II

FINAL REPORT: VOLUME I, CHAPTER 2

THE DOMAINS OF VARIABLES INVESTIGATED AND THEIR INTERRELATIONS

INTRODUCTION

In the preceding chapter we described the purposes and general strategy of this study. In that chapter we pointed out that a major goal of the strategy was the investigation of the structure of interrelations among variables presumed to be related to teaching performances and children's learning. The concept of this structure will be developed in two steps. This chapter comprises the first step; Chapter 3, where the rationale for the structure is given, comprises the second step.

In this chapter we present the domains of variables included in the structure. Several models of process and structure are described to portray the major components of the total structure and to lay out the kinds of assumptions that were made to make hypotheses about causal relations among variables. Precise definitions of concepts, specifications of dimensions within the domain represented by the concept, and the operations by which measures and scores were developed to represent these dimensions are discussed in greater detail in Chapters 4, 5, and 6. At this point we are presenting the major domains, the construct defining each domain and their hypothesized inter lations.

The discussion of these domains is organized around two classes of variables: the domains of variables hypothesized to influence children's learning and the domains of variables hypothesized to influence teaching performances. This latter group is divided into two subgroups: domains associated with the characteristics of teachers and domains associated with the environment of teaching.

The Problem

What does a teacher do that helps a child learn? Although this question itself seems unambiguous, it is not a simple question to answer. How and what a child learns depends on many things. Teachers directly influence what a child learns, for example, by what they describe to him or her--the facts they present, the concepts they employ in organizing these facts, the significance they give to one idea in preference to another. Much of what a child learns also depends upon his or her abilities, motivation, and effort. Teaching skill, also a factor, is the ability to facilitate the learning processes by which children acquire the knowledge, skills, and attitudes that are generally regarded as the important outcomes of schooling. The problem of this study was to identify those teaching skills which significantly influence children's learning.

Children's learning in this study was restricted to the areas of reading and mathematics. Each of these areas was further delimited. Reading in this study includes the acquisition of decoding skills, the development of reading comprehension, skill in reading applications, and the development of positive attitudes towards reading. Mathematics includes the acquisition of computational skills and concepts, skill in mathematics application, and the development of positive attitudes toward mathematics.[1] The children in this study were enrolled in second and fifth grade classrooms in California schools. Teaching skill, in the context of this study, means ability to facilitate the acquisition of the reading and mathematics skills just enumerated.

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[1] These criteria will be described in greater detail in Chapter 5. The measures used to assess children's learning are described in Volume IV.

Although the problem was to identify those teaching performances which influence children's learning, other factors influencing children's learning must also be assessed. The goal of the research is to see if it is possible to find a significant relation between children's learning and teaching performance and to compare the magnitude of the effects of other factors such as the socioeconomic status of the pupils.

In the following section we describe the domains of variables known to influence or be related to children's learning that are independent of teaching performances. Variables in these domains were measured in this study, and their relation to children's learning was estimated.

Factors Influencing Children's Learning

It is well known that a variety of factors other than or in addition to teachers' skill in teaching influences children's learning. The first category of such factors are those related to the child's aptitudes. While we know that a variety of aptitude factors influence children's learning, we do not at the present time have a formal model of these aptitudes, their interdependencies, and their individual and mutual influence on learning. The purpose in this study was to select those factors, which because of a substantial body of knowledge or for sound theoretical reasons, we believed would have a marked impact on learning, either independently or by interacting with teachers' skills.

Among such factors, two categories of aptitude characteristics were measured in this study, verbal aptitude and cognitive style. Aptitude for the purposes of this investigation means an available capacity that the individual has which is relatively independent of specific learning tasks. It is a capacity to perform certain kinds of operations, the substance of which, while generally similar, will vary in detail from one task to another. It is a capacity to organize ideas and information in systematic ways which the individual imposes, as it were, on each situation.

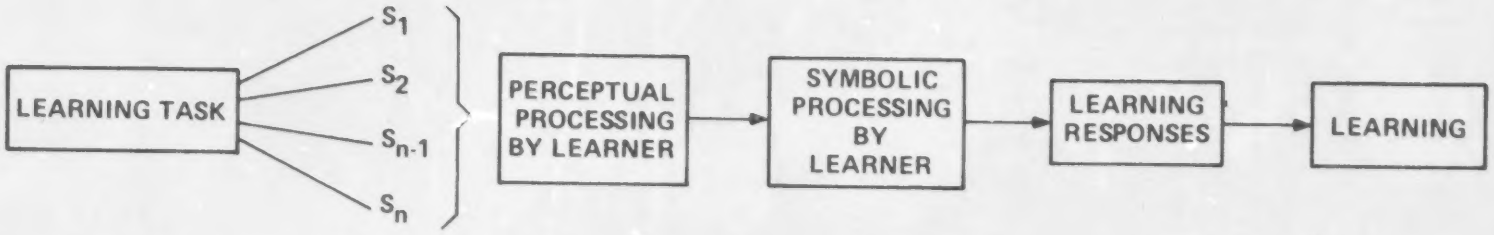
Verbal Aptitude

The major tasks presented to the child in the elementary school years, which are the media through which he learns, involve verbal and semantic symbols. Reading, for example, involves the manipulation by the child of verbal symbols in linguistic contexts. Similarly, mathematical tasks involve the manipulation of abstract symbols called numbers and their combinatorial rules. These kinds of tasks generally are mastered more easily if the individual has a higher order of what has been called verbal aptitude. Verbal aptitude is a generalized capacity to organize and manipulate verbal symbols. We have included, therefore, in the measurement system a measure of verbal aptitude. We assume that this measurement provides an estimate of each child's general capacity to organize and manipulate the verbal symbols and their rules of operation which are the substance of many of the learning tasks in reading and mathematics.

Cognitive Style

The processes by which the child learns to "make sense" out of his or her phenomenal world develop into perceptual-cognitive capacities. These capacities are referred to as cognitive styles because they are characteristic ways of organizing the perceptual-cognitive phenomena which the child experiences. Such styles influence how the child will organize a learning task in terms of its purposes and its structure and how the child will operate or function within the task. A measure of cognitive style was used in this study to identify the relative influence of such capacities on children's learning.

Figure 2.1 presents the model underlying the measurement of student aptitude. We are assuming that many of the learning tasks which the child confronts are symbolic and semantic in character; that is, the phenomena of the task come to the child in the form of words and numbers and rules for their combinations and manipulations. We are assuming that how the child approaches this task will be influenced by his cognitive style. Within the context of his cognitive style, his ability to cope with the requirement of the learning task will depend upon the extent of his verbal aptitude, that is, his capacity to manipulate verbal symbols. These two factors determine the character of the learning responses the child makes. Learning responses are those responses made during a learning activity which are necessary and sufficient if the child is to learn, where learning is defined as the acquisition of knowledge, skill, and



S_i = Stimuli of the learning task

Figure 2.1. Model of the Relation of the Child's APTITUDE Characteristics to Learning

attitudes. We are assuming that cognitive style determines what the child attends to in the array of stimuli that he perceives in a learning task, and how he organizes these stimuli. Given a selection of stimuli, the child's ability to manipulate them will depend in part upon his general ability to manipulate abstract symbols, verbal or quantitative. The third factor affecting his learning is his previous learning (which was estimated by the fall scores).

Expectations

Other factors influence a child's activities in a situation organized to stimulate his learning. One such factor is his expectations about success or failure in the task. These expectations derive from previous experience with the task or his general image of his abilities. They influence what the child is willing to attempt, the amount of effort he is willing to expend, and his interest in and attitude toward the task. The measurement system in this study provided data on each child's expectations about his or her performance in both reading and mathematics.

The model portrayed in Figure 2.2 is a network of hypothesized relations. Hypothetical causal relations are indicated by straight lines, with the arrowhead indicating the direction of causality. Where causal relations cannot be hypothesized, we have predicted a correlation between domains of variables represented by a curved line.

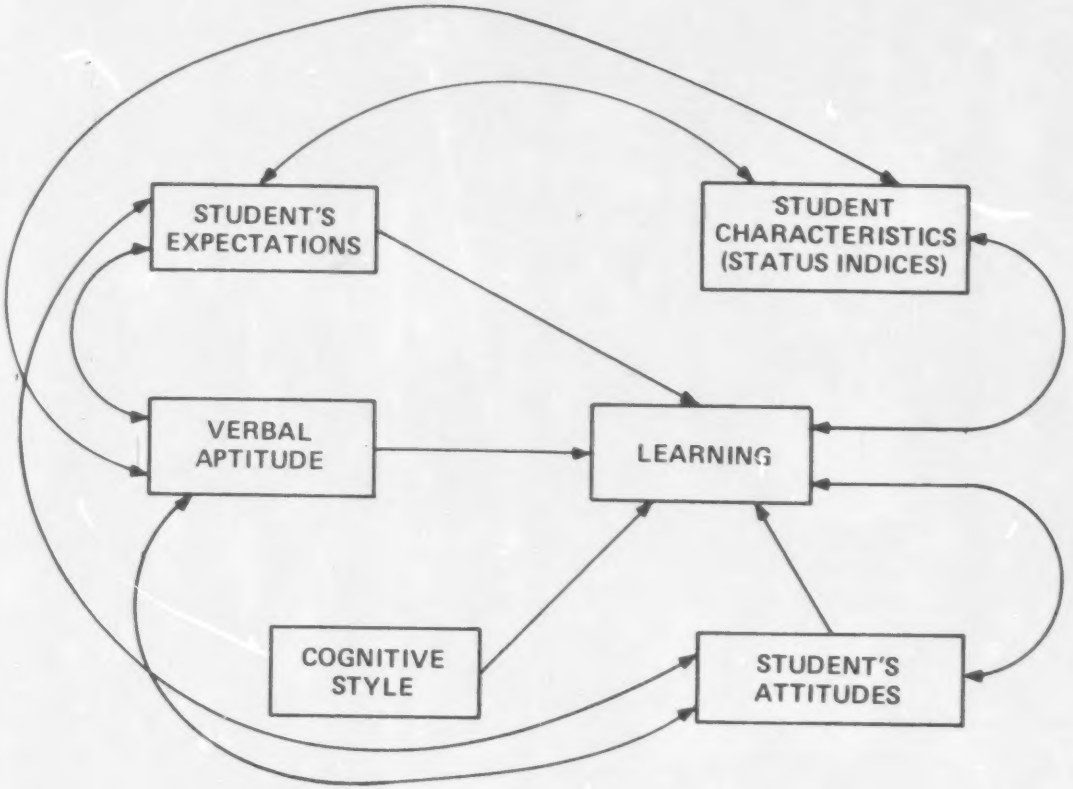


Figure 2.2. A Model of Factors Influencing Student Learning
Conventions: Straight lines indicate hypothesized causal relations; curved lines indicate correlated variables for which causal relations are not hypothesized.

Figure 2.2 presents the model that relates expectation and aptitude to learning. This model portrays aptitude and expectation as having independent direct influences on learning responses. We also expect there to be a correlation between aptitude and expectation (symbolized by the curved arrow). Two assumptions are involved in this model. First, that cognitive style and aptitude are independent.[2] We assume that cognitive style is a sorting and organizing process; it influences what will be attended to. Symbolic processing determines how these stimuli are manipulated. At the level of specific responses, the two processes may be intertwined, but the capacities underlying the processes are independent. Verbal aptitude does not determine cognitive style, nor cognitive style verbal aptitude. (They may, of course, both be aspects of an underlying variable; but we do not know what that might be.)

The second assumption is that the causal relations between expectations and aptitudes cannot be specified. Since expectations may be determined by factors other than aptitude, expectations could determine how a child approaches a task which, if mastered, would enhance his aptitude. Suppose that a child thinks that he has little manual dexterity. He may have developed this view of his abilities because somebody usually performed manual tasks for him. He will probably

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[2] The research literature on this point is mixed. We followed the opinion of H. Witkin on this point (personal communication). The independence assumption simplifies the path equations, an advantage, given the complexity of the structural model used in this study.

avoid or participate less than wholeheartedly in tasks requiring manual dexterity. Thus, he is deprived of the opportunities to learn the responses which constitute the aptitude of manual dexterity.

Contrariwise, we can foresee the following possibility. A child confronts a task but he has no preconceptions about his abilities to perform the task. He is more or less successful in performing the task. Experience with a succession of such tasks shapes his conception of his ability to perform this class of tasks. Thus, ability to perform the tasks will shape his expectations.

We would expect to find in any sample of children some whose abilities have influenced their expectations and others whose expectations have influenced the development of their abilities. Since it is impossible to sort out the two groups in a study of this kind, causal relations cannot be predicted. We expect the two variables to be correlated, however.

Socioeconomic Status (SES)

Other characteristics of students are related to their learning. The socioeconomic background of the student is an example. Socioeconomic indices are quantitative measures of complexes of factors which generally reflect learning opportunities and learning incentives in different socioeconomic backgrounds (some measures are quantitative in the limited sense that they indicate only absence or presence). Such indices are not themselves direct causal agents but are quantitative representations of causal agents which directly and indirectly affect learning. We

have, therefore, included data on such socioeconomic factors in the measurement system of this study. In Figure 2.2 we portray the relationship of these factors to learning by indicating that we expect a correlation between such factors and learning outcomes.

Thus, two major potential sources of variation in student learning have been identified, the aptitude characteristics of students and their expectations about their learning performance. Other factors influencing learning such as the previous learning history of the children are reflected in the socioeconomic indices.[3] While the particular measures used in this study do not cover the entire range of the measurements that could have been made, they are representative of the class of measures which must be taken into account in any analysis of variacion in student learning. The specific measures and procedures used to assess these factors in this study are representative of measures which have been shown to have significant relations with student learning.

Attitude

Another factor is included in the model portrayed in Figure 2.2, student attitude. Attitude means a generalized preference for participating in a class of tasks. An attitude is usually thought of as an

[3]The effects of previous learning are estimated directly in this study by the tests given in the fall. The socioeconomic indices correlated significantly with fall achievement scores. Although we expected this result, we thought it best to confirm our expectations. But we also needed an appropriate measure of SES to use in a variety of analyses.

antecedent of motivation. In this study, children's attitudes towards reading and mathematics were measured at the beginning and end of the school year.

Attitudes measured in the fall were attitudes held prior to the observations of teaching. Therefore, we ordinarily would predict a causal relation between attitude and learning. For the purposes of the presentation at this point, we have indicated such a causal relation. The reader should be alerted, however, that we will be discussing both fall and spring measures of attitude.

A statement relevant to measures selected for this study is appropriate here. In the discussion above and the accompanying figures we have indicated domains of variables which on theoretical and empirical grounds are hypothesized to be highly related to student learning. In selecting measures within domains we have adopted the strategy of choosing reliable measures which have a history of demonstrated relations with student learning.[4] Each measure or set of measures in a domain is representative of the variables in that domain.

We are assuming that relations will be found between a representative measure of the variables in the domain and children's learning. It was not the goal of this study either to explore the

[4]The reader should be warned that we developed some measures for this study. These measures turned out to be highly reliable.

structure of children's aptitudes as they relate to learning or of children's expectations as they relate to learning (though a special study was done on this relation; see Volume V, Chapter 2) or all of the range of possible student characteristics that could be studied as they relate to children's learning.

The model presented in Figure 2.2 represents the most abstract structure that could be described in terms of our present state of knowledge about factors influencing student learning. Similarly, the model of the processes (Figure 2.1) between the stimulus events of the learning tasks and the responses that children make in these tasks represents a hierarchical organization of the relations among five major domains: tasks, cognitive style, verbal aptitude, learning responses, and learning. In that particular model we are assuming that general capacities act as intervening variables which influence both how the learner responds to an event and how the learner in turn acts within that event. This model and its associated assumptions guided the development of the measurement system.

Factors Influencing Teaching Skill

In this section we set aside temporarily a definition of teaching skill in order to outline the range of variables that must be considered as potential influences on teaching skill in any study of the relations of teaching skill to children's learning. As we proceed through this section we are again identifying domains of variables likely to be related to teaching skill. We consider two

classes of such variables: those related to characteristics of teachers and those related to characteristics of the environment in which the teachers are teaching.

Characteristics of Teachers Likely to Influence Teaching Skill

Figure 2.3 presents a model of the relations among these domains of variables. The dependent variables, the object of study in this case, are the teaching performances themselves. The questions being asked are, to what extent do expectations, knowledge, and attitude influence teaching performances? The model implies that there are direct relations between each of these domains of variables and the domain of teaching performances (this causal relationship is represented by the straight line arrows). We also expect relations among some of the domains themselves, though neither theory nor previous research is sufficient to make causal predictions. Predicted correlational relations are indicated by curved arrows in the model.

Subject Matter Knowledge

The teachers in this study were observed trying to help children acquire knowledge of, skill in, and positive attitudes towards reading and mathematics. Consider the learning of mathematical concepts as one example. One expected outcome is that children will have acquired a set of mathematical concepts. Obviously the teacher must have acquired the concepts and understood them sufficiently to help another person to understand them. If the concept of a set is to be learned,

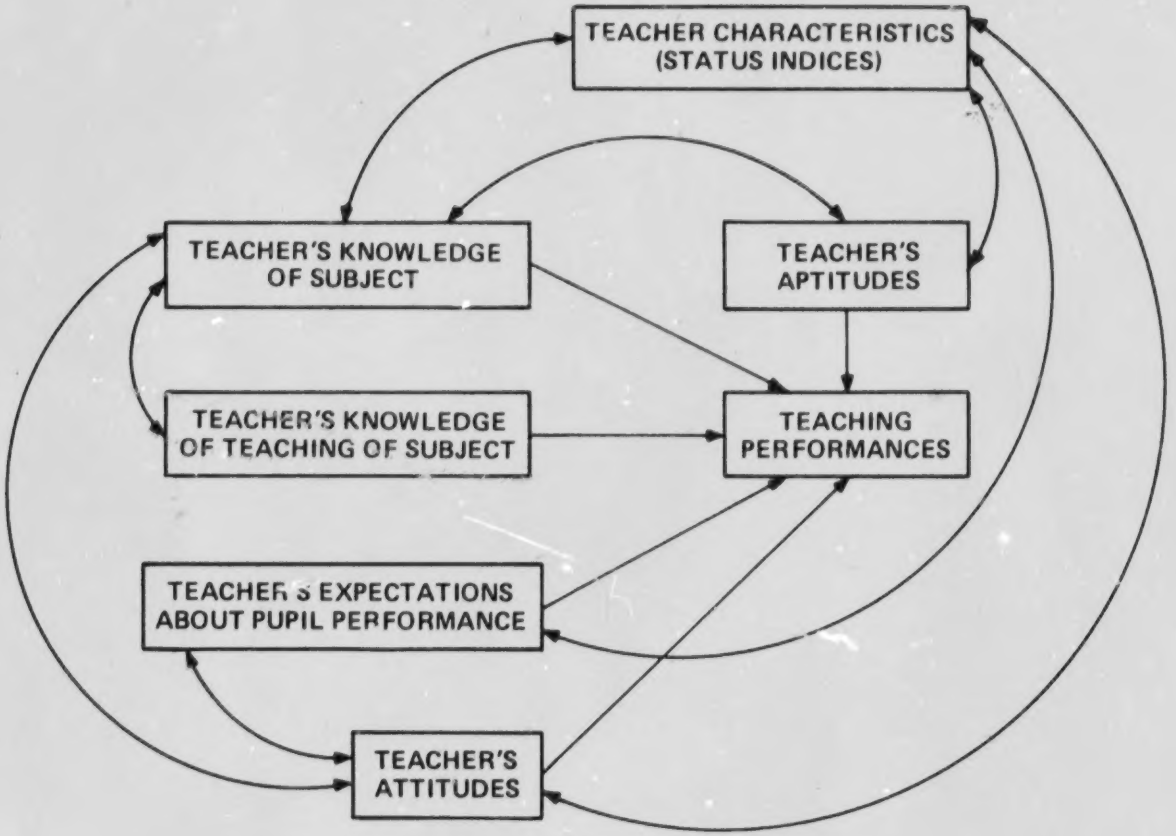

Figure 2.3. Model of Factors Influencing Teaching Performances

for example. Presumably a teacher who knows more methods and is familiar with more materials for the teaching of reading has more choices available on which to base his or her instructional strategies. Although it is possible that the teaching of reading or mathematics is sufficiently routinized that knowledge of a diversity of approaches would be unrelated to what teachers actually do. It was the purpose of this study to allow for the possibility that such variations in knowledge may be related to variations in teaching performances. Measures of knowledge of teaching methods, materials, and problems were included in the measurement system.

Expectations about Pupil Performance

The three domains of variables discussed above represent categories of characteristics that the teacher brings to the teaching act or event.[5] A fourth class of factors that may influence how the teacher teaches is the characteristics of the students. Each teacher will presumably develop expectations about the children's potential for learning, their abilities, their achievements. Although we know very little about how these expectations are formed, we do know that they may be related to age, sex, and socioeconomic differences among the children being taught. It is generally believed, and a well-known research study is frequently cited to support this belief (Rosenthal, 1968), that these expectations influence student learning, though it is not clear how the expectations act upon children's learning.

[5] The teacher's knowledge of and attitude towards reading and mathematics may change in the course of teaching the subjects. We did not pursue how changes of this kind might affect teaching performances for reasons that we will discuss subsequently in this volume under the heading of The Measurement System; see Chapters 5 and 6 of this volume and Volume IV.

the teacher must know what a set is. The measurement system therefore included measures of teachers' mathematical knowledge. Similarly, in the area of reading, teachers' decoding skills were measured.

Teachers' Attitude

A teacher's attitude towards what he or she is teaching may be assumed to be communicated either quite directly or subtly to the child. This communication takes different forms, such as comments that are negative in character which indicate that the teacher either does not like the subject at hand or finds the subject particularly difficult (from which the child may infer that the teacher is negative about the task). Such comments communicate to the child how the teacher thinks and feels about the work in which they are involved. Since the teacher is a model for the student, we expect some students to be influenced by these kinds of remarks by the teacher.

Similarly, the teacher may indicate his or her attitude toward the subject by exhortations to and stimulation of the child to become more deeply involved. Avoiding a topic or delimiting the amount of time spent on that topic may be cues that indicate to the child a lack of interest on the teacher's part or a negative attitude towards the topic. Therefore, the teacher's attitudes towards teaching reading and mathematics were measured in this study.

Knowledge about Teaching

A third factor is the teacher's knowledge about the teaching of reading and mathematics. There are a variety of ways to teach reading,

effectiveness produced a significant correlation between measures of teacher verbal aptitude and measures of student achievement (Coleman, 1966). This finding has led to considerable speculation about the relations between the verbal aptitude of a teacher and what his or her students may learn, though neither data nor theory has provided any model of causal connections between these two domains.

We develop here briefly a concept which will be expanded upon in the following chapter. Aptitude in this context again means general capacities that an individual uses in a variety of situations to interpret them and to interact in them. A question of interest in this study is, what aptitudes of teachers are related to effective teaching?

Consider the nature of a teacher's activity while teaching. Four classes of activities may be hypothesized as likely to occur. The teacher must assimilate and encode the information that he or she is receiving from students (where information is the category name for all of the different kinds of stimuli which are perceivable in a classroom). In teaching reading, for example, the teacher must identify the reading sounds made by a child to distinguish errors in decoding which the child is making. Similarly, the teacher must understand the statements or questions of students, as, for example, when the child gives an interpretation of a reading passage. The teacher, like any other person, must organize this perceptual world and, presumably, a complex encoding process is used as a first step to achieve this organization.

It is reasonable to assume that such expectations influence teaching performances, so that the teacher's skills are used differentially with various children. It is equally plausible to assume that teachers make sure that no child suffers because the teacher does not expect him to do as well as other children. Whichever hypothesis proves to be more valid (and both may be valid for different teachers), it is reasonable to explore the relation of this domain of variables to teaching performances and teaching skill. The measurement system therefore has included measures of teachers' expectations about each child's performance in the teacher's class.

Teacher Status Characteristics

A fifth domain of variables associated with the characteristics of teachers may be related to the domains that we have just discussed. There are men and women teachers in this study who differ in age, socioeconomic background, and previous education and experience. We have collected information on these status characteristics of teachers and expect them to be related to some degree to such factors as the teacher's knowledge or attitude. In Figure 2.3, therefore, we have included a box representing this domain and have suggested that there are correlations between these characteristics and teachers' knowledge, expectation, and attitude.

Cognitive Aptitudes of the Teacher

A sixth domain of teacher characteristics was also explored because it was reasonable to expect relations between this domain and the domains previously discussed. A major study of school

As this information is encoded, the teacher must interpret it. In teaching, the interpretive process usually consists of comparing the statements, actions, or products of a student against a standard of some kind. Again in reading, for example, the teacher who is listening to a child read orally is listening for decoding errors. He or she presumably knows one or more correct decodings and evaluates the child's decoding against these standards. The teacher may be considering the reasoning processes that a child used to arrive at his interpretation of a reading passage. The teacher compares them to a standard, in this case, his or her own reasoning about the same passage. Teaching requires that teachers make a very large number of such interpretations across a very wide range of events.

The teacher must, havir organized the stimuli coming to him or her and interpreted these stimuli, formulate what he or she will do or not do. In this process presumably the teacher draws upon his or her knowledge and abilities, utilizes his or her memory of comparable experiences, and formulates a way of acting at that moment. This process of organizing a response in a sequence of interactions between the teacher and students is probably a complex transformational process that yields alternatives for action.

The teacher must then select among the alternatives; that is, the teacher must make decisions. Thus, a process of evaluating these alternatives presumably occurs out of which comes a decision to act.

These four processes occur rapidly, and the teacher may move back and forth between the processes. We assume that these processes or analogues of them occur in the course of teaching performances. We expect that variations in teaching performances will occur as a function of variations in these processes.

But these four processes describe events that we cannot directly observe. All we can see is what the student does and what the teacher does when either is the initiator of a sequence of action. We are, however, assuming that events that we cannot observe are occurring as the teacher thinks about what he or she has seen or heard and as he or she prepares to respond.

Since each of these internal processes encompasses a very wide range of different kinds of sorting processes and memories and organizations of knowledge and experience, it is reasonable to assume that general capacities of a perceptual and cognitive character are likely to influence strongly these processes. It is reasonable, for example, to assume that an individual who has a higher level of ability in inferential reasoning is more likely to use this ability in interpreting a reading passage and to use this ability in estimating the degree to which the child approximated the same process; or to use this ability to try to stimulate the inferential reasoning processes the child has used to arrive at his interpretation. Similarly, as in the case of the child, we expect the teacher's cognitive style to affect the decoding of the stimulus world of teaching.

Unfortunately, we have few guides from previous research to suggest what kinds of abilities might affect teaching performances. We have sampled, therefore, in a domain of variables which has been organized into a structure of aptitude (Guilford, 1967). We have chosen typical verbal aptitude measures both with a view to replicating the findings in the Coleman Study and with a view to determining the extent to which there is a direct relation between verbal aptitude and teaching performance. We have also used measures of verbal flexibility usually associated with measures of creativity; measures of deductive and inferential reasoning; measures of memory which involve memory tasks like those required in teaching; and measures of cognitive style.

The basic assumption in this aspect of the study should be noted and underlined at this point. We are assuming that measures of teacher's aptitudes are indicators of the likelihood that the teacher is able to enact basic processes which are related to varying degrees of skill in teaching performances.

Since the teachers' aptitudes are presumably relatively stable, we must assume that they have influenced other characteristics of the teacher. Therefore, in Figure 2.3 we have drawn a line representing a causal connection between the domain of aptitude variables and the domain of knowledge variables. Similarly, we expect aptitudes, particularly aptitudes associated with cognitive style, to influence expectations.

Figure 2.3 presents a structure of the hypothesized relations among these domains of variables associated with teachers and teaching performances. Each of the domains, with the possible exception of the teachers' expectations (which may be more fluid and dynamic), are antecedent in time to the events of teaching. They also represent what may be relatively stable characteristics of the teacher. We do not expect the teacher's cognitive style, for example, to change markedly simply as a result of teaching, because this cognitive style represents a characteristic way of interpreting the world that has long since been habituated.

Some of these abilities may be modified by specific training; for example, teachers may develop skills in inferential reasoning that they do not now have. Although the question of whether or not a specific aptitude may be modifiable is an important one, it was not the purpose of this study to answer this question. The purpose is to determine the extent to which variations in aptitude may be associated with variations in teaching performance, and subsequently, to raise the question as to whether or not the aptitude might be improved by specific training.

Factors Associated with the Environment of Teaching

The term, environment of teaching, will be given more precise operational meaning in a subsequent chapter. For the purposes of explication here, the term is meant to embrace those physical and

psychological conditions over which the teacher has less direct control, which may impinge upon teaching performances by allowing them, encouraging them, or stimulating them, or inhibiting or depressing their frequency, precision, or quality.

A few simple examples will illustrate the general character of these events. A teacher may know several different ways to teach reading but may not have the resources available in the form of books or other materials to conduct a particular instructional strategy in reading. The principal's administrative style may determine the degree to which the teachers participate in determining the purposes and objectives of instruction, the methods of instruction, the styles of interaction with students, the rewards for innovative teaching, and the psychological climate in which teaching is conducted. The children are from a particular community which has distinctive characteristics. Resources available, the organizational structure and administrative style, and the community characteristics are the bounds within which instruction occurs. These factors do not yield easily to initiatives for change emanating from the teacher. They are bounds within which the teacher organizes and conducts instruction. We would expect them, therefore, to have a significant influence on how the teacher teaches and to influence how the students approach learning tasks.

Figure 2.4 presents a model of this domain of variables. The domain called support for innovation is an index of the flexibility of resources for a variety of curricular, organizational, and instructional programs. The domain, "organizational structure," is the system of roles, status, and patterns of relationships in this system. The domain "principal's and teacher's perceptions of the organization" represents those variables which are intra-personal reactions to the organizational structure within which both the teacher and the principal work. "Teacher's attitudes" represents a complex of attitudes about teaching, about the effectiveness of one's teaching, about the students being taught. Chapters 5 and 6 describe how these constructs were measured in this study. As the model suggests, the domain of organizational variables and the domain of teacher-attitude variables are the primary influences on teacher performance.

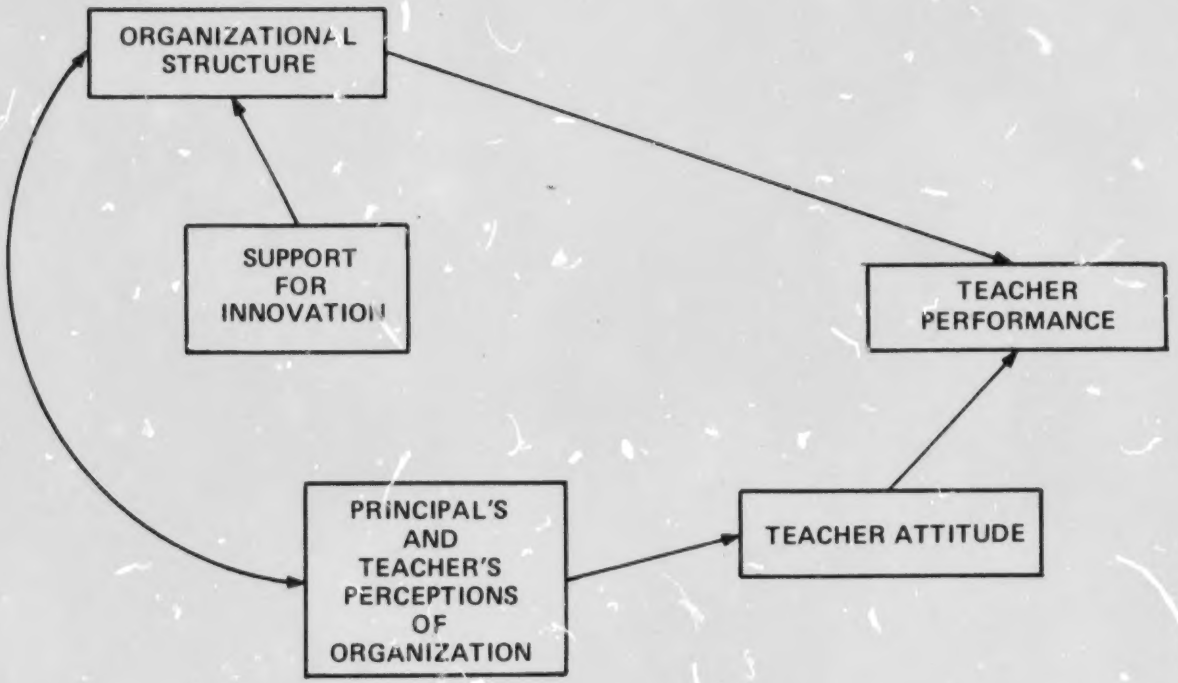

Figure 2.4. Structural Model of Variables Associated with the Environment of Teaching

Summary

In this section we have presented the major domains of variables influencing student learning and teacher performance. Three mini-models have been presented; they will be incorporated in a larger model in the next chapter. The purpose here is to indicate that these domains have been explored in order to estimate the relative influence of these domains on teaching performances and children's learning.

Each domain potentially contains a wide array of variables which have common characteristics. The domain of teacher-aptitude variables, for example, includes those variables which have in common that they are relatively stable characteristics, such as preferences for and orientations to many different people, events, and situations, that influence how the person acts, reacts, and interacts across a wide variety of events. The domain of student variables represents an array of characteristics of students which are likely to influence learning across a wide variety of teachers and learning situations. The domain of organizational variables represents the contextual variables in which teaching occurs, and they have in common that they are factors present in the situation which are relatively unmodifiable by the teacher and whose influence determines the kinds of decisions that the teacher may make about instructional activities and how he or she is likely to feel about teaching activities.

In the next section we discuss the basic assumptions about the nature of teaching events underlying these models. Then in the following section we delineate more sharply the focus of the problem which was the object of study in this research.

The Nature of Teaching Activity

The purpose of this study is to answer the question, what are the effects of teaching? This question assumes that we are looking for actions on the part of teachers whose effects are measured by changes in the behavior of children. These actions are among the presumed causes of learning, even though we know that learning may take place as a consequence of other activities undertaken by the learner or as a consequence of events or people who are not teachers. Out of all the events that may influence what a child learns, teaching actions are a subset of actions undertaken by a person intending to instruct and which produce some proportion of that learning.

The basic model of the process of teaching is portrayed in Figure 2.5. In this figure, teaching performances are conceptualized as antecedent events whose immediate effect is upon student behavior, and this behavior in turn is the antecedent event to the consequence of learning. Student behavior embraces both observable and nonobservable actions on the part of the student; for example, we assume that if a student is thinking about a problem, his thinking affects what he learns, even though we do not see these actions but only some weak indicators of them. Any analysis of the effects of teaching must begin with observations of both teaching actions and students' behavior, as well as measures of what the students have learned.

A thought in the head of the teacher becomes a thought in the head of the students only by being transmitted through words or actions on the part of the teacher and student, and through some processes by which

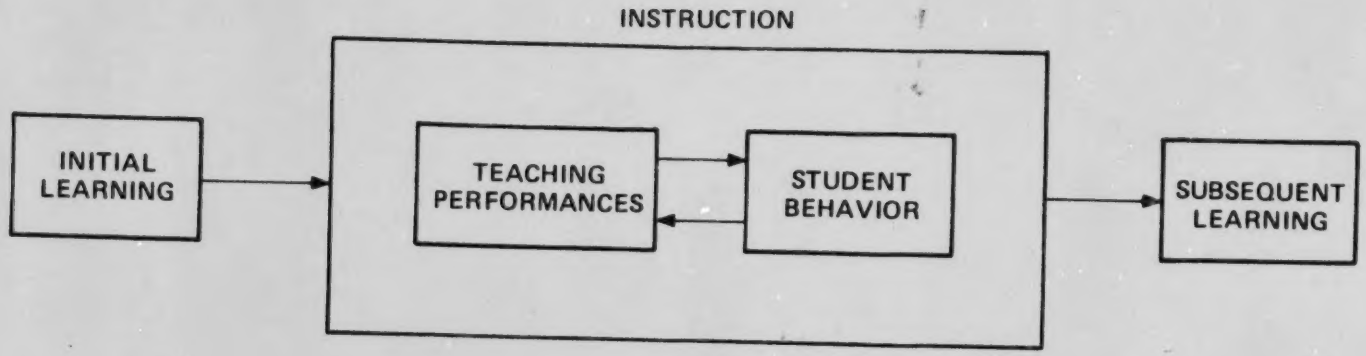

Figure 2.5. A Paradigm for the Analysis of the Effects of Teaching Performance

the student organizes these words into a thought in his head. The link between the thought in the head of the teacher and the words that transmit it may be weak; or the student may not understand the communication or misinterpret it. But the researcher has only three events on which he or she can gather data directly--the actions of the teacher, the actions of the student, and the indicators of what the student has learned or how he or she has changed.

We assume also that the actions of the student influence the teacher. A complex analysis of teaching performances must take into account both the effects of teaching performances on the student and the effects of students' behavior or performances on the teacher. But to say this is merely to indicate the scope and the difficulty of the problems of measurement and analysis. The conceptual paradigm remains the same; it is a representation of a set of events, the principal categories of which are teaching actions, student behavior, and stable changes in learning.

The paradigm as portrayed in Figure 2.5 indicates that we are interested in the change in children's learning. Therefore, we must obtain indicators of that learning at some initial point in time and indicators of that learning at a later point in time. Between these two samples of indicators of learning occur the events which presumably affect that learning, the actions of the teacher and of the student.

There are many puzzles and complications in applying this paradigm to the analysis of teaching behavior. The most difficult

puzzle is that of estimating the nonobservable events which presumably affect the teacher's actions, the students' behavior, and the linking of student behavior to subsequent learning. Since we have no direct measures of these nonobservable events, we have chosen in this study to measure characteristics of the teacher and the student which are likely to influence them. Thus, the measures of teacher aptitude and student aptitude, of teacher expectations and student expectations, of teacher attitude and student attitude, of teacher knowledge of the subject and of how to teach it, and of student background are to be thought of as indices of these nonobservable events.

The Focus of the Problem

The problem to be solved is to identify those teaching performances which relate in a significant way to changes in children's learning. In this study children's learning was measured in reading and mathematics at two points in time, in the fall of 1973 and in the spring of 1974. These two sets of measurements provide the data from which estimates of variations in gain in learning may be made. During the intervening period teachers and children were observed at periodic intervals (the pattern of observation is described in a later chapter). The analytic task is to determine which teaching performances relate significantly to positive changes in pupils' achievement in reading and mathematics and growth in positive attitudes, and to identify those performances which distinguish the teachers whose students made the greatest gains from other teachers.

The results of these analyses provide the basis for making statements about the relations of teaching performance to children's learning. But as we have pointed out in the preceding pages, it is also necessary to estimate the influence of other factors on children's learning. The goal of the analysis is to estimate what portion of the variance in student achievement and change in attitude may be attributed to variations in teacher performance. Assuming that variation in teacher performance accounts for a portion of the variance significantly greater than zero, then the teacher performance information is analyzed to determine which performances are the most effective; that is, which performances distinguish the teachers who produce the greatest amount of student gain in achievement and growth in attitudes.

This study will, therefore, answer two major questions, one pertaining to the effect of teaching performances on children's learning, and one pertaining to those performances which appear to be critical in achieving the greatest amount of gain or growth in achievement and positive attitudes.

These are the focal questions of this study. But as we have pointed out in the preceding pages, we are also interested in determining the extent to which teaching performances are affected by or related to a variety of other variables such as the characteristics of the teacher and the teaching environment. The basic paradigm of the study is provided in Figure 2.6. In that figure, the focal

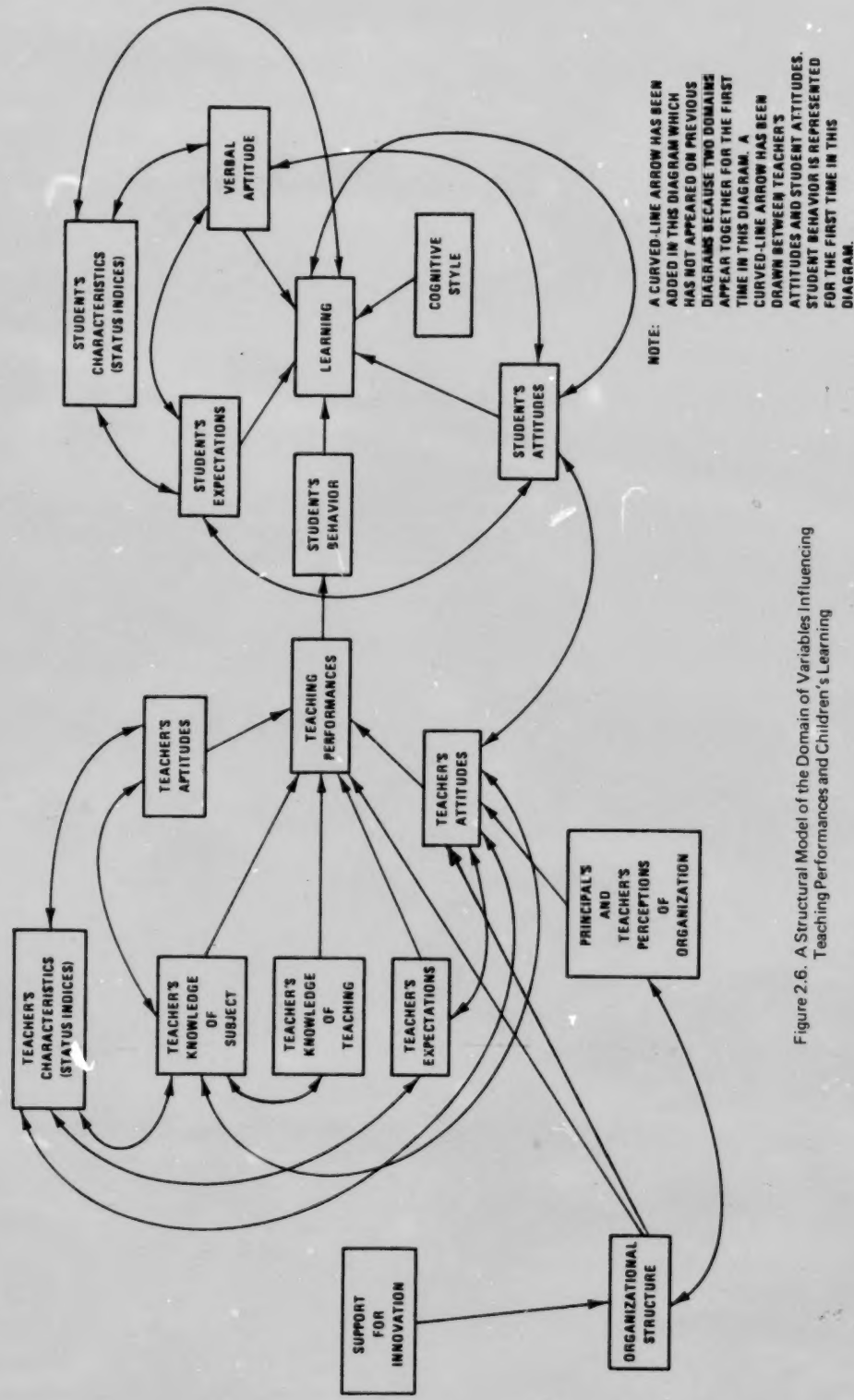
STUDENT'S CHARACTERISTICS (STATUS INDICES)
VERBAL APTITUDE
COGNITIVE STYLE
LEARNING
STUDENT'S EXPECTATIONS
STUDENT'S BEHAVIOR
STUDENT'S ATTITUDES
TEACHER'S APTITUDES
TEACHING PERFORMANCES
TEACHER'S ATTITUDES
TEACHER'S CHARACTERISTICS (STATUS INDICES)
TEACHER'S KNOWLEDGE OF SUBJECT
TEACHER'S KNOWLEDGE OF TEACHING
TEACHER'S EXPECTATIONS
PRINCIPAL'S AND TEACHER'S PERCEPTIONS OF ORGANIZATION
SUPPORT FOR INNOVATION
ORGANIZATIONAL STRUCTURE
NOTE: A CURVED-LINE ARROW HAS BEEN ADDED IN THIS DIAGRAM WHICH HAS NOT APPEARED ON PREVIOUS DIAGRAMS BECAUSE TWO DOMAINS APPEAR TOGETHER FOR THE FIRST TIME IN THIS DIAGRAM. A CURVED-LINE ARROW HAS BEEN DRAWN BETWEEN TEACHER'S ATTITUDES AND STUDENT ATTITUDES. STUDENT BEHAVIOR IS REPRESENTED FOR THE FIRST TIME IN THIS DIAGRAM.

Figure 2.6. A Structural Model of the Domain of Variables Influencing Teaching Performances and Children's Learning

problem is represented by the relations among the boxes labeled teaching performance, student's behavior and student's learning. Teacher performance is measured primarily by direct observation of teachers' actions in the classroom. Student behavior is measured by observations of students in the classroom. Student learning is measured at two points in time by an array of instruments which measure students' knowledge of decoding skills, reading comprehension, skill in reading applications, attitude towards reading, skills in mathematical computation, understanding of mathematical concepts, skills in mathematical applications and attitude towards mathematics.

Variables associated with characteristics of the teacher are represented by the boxes labeled teacher's characteristics which include measures of factors related to the teacher's background; teacher's knowledge of what is to be taught and how to teach it; teacher's attitudes towards teaching the subject being taught; teacher's expectations about student performance; and teacher's aptitudes. This portion of Figure 2.6 incorporates the model presented in Figure 2.3.

Variables associated with the environment of teaching are those related to support for innovation, organizational structure, teachers' and principals' perceptions of the organization and teachers' attitudes towards the organization and teaching. This portion of the diagram in Figure 2.6 incorporates the model in Figure 2.4. Thus, Figure 2.6 incorporates in one structural model the three models presented in Figures 2.2, 2.3, and 2.4.

The Goals of the Study

The goals of the study have been indicated at various points throughout this chapter and are summarized here briefly. The study initially had two major purposes; first, to develop hypotheses about the relations of teaching performances to children's learning; second, to develop instruments for measuring both teaching performances and children's learning that could be used in a continuing analysis of this relationship.

The staff of the National Institute of Education urged before the study actually began that it be expanded in order to make the study as comprehensive as possible. The Institute provided additional funds for the study of what was then called administrative climate[6] (what we have called here the environment of teaching), for an expanded study of teacher aptitude, and for more extensive observations of the teachers. The research staff of Educational Testing Service recommended to the California Commission on Teacher Preparation and Licensing that other variables be added to the design such as student aptitude and cognitive style, student characteristics, teacher characteristics, teacher expectations, teacher attitudes, and teacher knowledge of the subjects being taught and how to teach them. The consequence of these recommendations, which were accepted and approved by the California Commission, was that the design of the study was expanded to include the variables represented in the structure presented in Figure 2.6.

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[6]Dr. George Gustafson, former Executive Secretary of the California Commission on Teacher Preparation and Licensing had also urged that the role and functions of the principal be included in the study.

Another consequence was that the goals of the study were also expanded to include the following: (1) to estimate that portion of the variance in student achievement and attitude that can be attributed to variations in teaching performances; (2) to identify those teaching performances associated with the most significant gains in student achievement and growth in positive attitudes towards reading and mathematics; (3) to estimate the influence of other factors such as students' socioeconomic status and aptitudes on student learning; (4) to estimate the influence of a variety of teacher characteristics, including teachers' background, aptitudes, knowledge, attitudes, and expectations about student performance, on teacher performance; (5) to estimate the influence of characteristics of the environment of teaching on teaching performance; (6) to develop an array of measures which would sample significant variables in each of these domains.

Different theorists of teaching will construct somewhat different structures of variables to analyze the relations among these variables. The rationale for the particular structure used in the analyses in this study is presented in Chapter 3. Other researchers might also have made other choices of particular variables to be measured in each domain. The rationale for the particular choices used in this study is also presented in Chapter 3; obviously choices of what to measure and how to measure it were circumscribed by factors of time available for testing and the cost of such testing.

BEGINNING TEACHER EVALUATION STUDY: PHASE II

FINAL REPORT: VOLUME I, CHAPTER 3

THE STRUCTURAL MODEL AND ITS RATIONALE

be tested by experimental methods (Borgatta and Bohrnstedt, 1969; Costner, 1970; Duncan, 1975).

We have selected one of these procedures for use in this study, path analysis. A structural model of relations is necessary for writing the path equations to be used in the analysis. The structural model stipulates in advance hypothesized relations among the variables and equations are written to describe this model.

Another reason for using a structural model to analyze the data set was to achieve ease and economy in interpreting relations. There are 180 variables in the data base at this stage of the analysis of the original data. The alternative to using a path model would have been to try to understand a 180 x 180 matrix. This is clearly an impractical alternative.

The first part of this chapter presents the concepts underlying the use of structural models. This presentation is more detailed than a reader familiar with these methods needs. But many readers will be seeing this approach applied to educational data for the first time. We have contrasted our approach with prediction or estimation procedure so that the logic of the analytic strategy will be clear.

The second part of the chapter presents the rationale for the model we constructed. In thinking about the model as we designed it, we stayed as close as possible to available research, to simple theoretical explanations for how variables might relate, and to common sense assumptions about the nature of classroom events.

INTRODUCTION

This chapter has two purposes: (1) to explain why a structural model of the domains of variables was developed for analysis; and (2) to give the rationale for the particular model used in this study.

The teaching performance variables are the critical independent variables in the study. But, it is important to know how much differences in these performances are related to differences in teachers' experience, educational background, aptitude, and knowledge. What is really desired is an estimate of how much a change in the kinds or levels of education or experience or knowledge or aptitude might make on how teachers teach. Would increasing educational requirements or knowledge change how teachers teach? Would selecting teachers with certain aptitudes or characteristics increase the likelihood of developing better teachers?

A multivariate study of this kind does not directly test causal relations of the kind implied in such questions. Variables have not been manipulated systematically and other variables controlled so that the direct influence of one variable on another could be measured. Some may think, therefore, that no inferences can be made about possible causal relations when one has only correlational data. But partial correlational methods have been used for some time to estimate dependencies among variables. In recent years social scientists have learned to use a variety of such procedures to estimate such dependencies, particularly when inferences about causal relations cannot

In reading this chapter the reader will encounter sentences with words like "hypothesized structure" and "hypothesized relations." Recalling the purpose of Phase II to generate hypotheses, the reader may wonder why these words and concepts are back into the discussion. Two major analytic strategies have been used in this study. One is multiple regression analysis of just the pupil achievement scores on teaching performances. This strategy has been used to analyze relations between pupil achievement and teaching performances and to generate hypotheses about their relations. Multiple regression is a more familiar strategy than is the use of path analysis, our second major analytic strategy. All of the kinds of data collected, including teaching performance and pupil achievement scores, are used in the path analysis. The path analysis tests the adequacy of a structural model which is a model or structure describing hypothetical relations among domains of variables. This strategy will also be used to develop hypotheses about teaching and learning but these hypotheses will predict how other variables affect teaching and learning.

A more complete picture of educational processes is provided by using both strategies. Also the path analysis approach will enable us to study such practical problems as how much teaching affects learning in conjunction with other influences on it such as the background, aptitudes, and attitudes of the learner, and how much the organization and administration of the school affect teaching.

Data on a variety of variables were collected to sort out how different variables related both to teaching performances and learning. A structural model was constructed to use all of these data to make inferences about what influences what. This model is a set of hypotheses about relations among the domains of variables. Such a model also allows hypotheses to be generated about teaching and learning, and inferences to be made about causal dependencies among all of the variables related to teaching and learning.

The Utility of Structural Models

An investigation is founded on a concept of a domain of variables believed to be interrelated--this belief having been created from a conceptual analysis of the variables, from an analysis of previous research and theory or even from an analysis of experience. This concept may be stated formally in a set of propositions (in the logical sense) which describe two kinds of formal relations; one that variable A is the cause of variable B; and a second kind, that variable A is associated or correlated with variable B.

This set of logical propositions forms a structure because the propositions state relations among a group of variables by describing their mutual and causal interdependencies. This set of interdependencies may be formally portrayed in a diagram as in Figure 2.6. Note that a structure (as the term is used throughout this report) is a concept of interdependent and causal relations among variables. It is not merely a collection of successive and independent statements about relations.

Correlational and Causal Descriptions of Relations

Assume there are three variables of interest, student's aptitude for mathematics (A), teachers' performance skills in teaching (B), and children's learning of mathematics (C). Contrast the following two descriptions of the relations among these variables.

First, consider this set of propositions or hypotheses:

1. A (student's aptitude) is correlated with B (teachers' performances). If A varies, then B covaries with it.
2. B (teachers' performances) is correlated with C (children's learning). If B varies, then C covaries with it.
3. A (student's aptitude) is correlated with C (children's learning). If A varies, then C covaries with it.

Covariation means (1) as A increases in magnitude, B also increases; or (2) as A increases, B decreases; or (3) as A decreases, B also decreases.

These propositions or hypotheses may be tested by measuring the occurring variation in the variables, calculating the correlation between the measures and estimating their significance. At the conclusion of such studies, one has an estimate of the validity of each hypothesis.

These three variables may be interrelated by hypothesizing the following functional relation among them:

$$(1) \qquad y = b_1 x_1 + b_2 x_2 + c$$

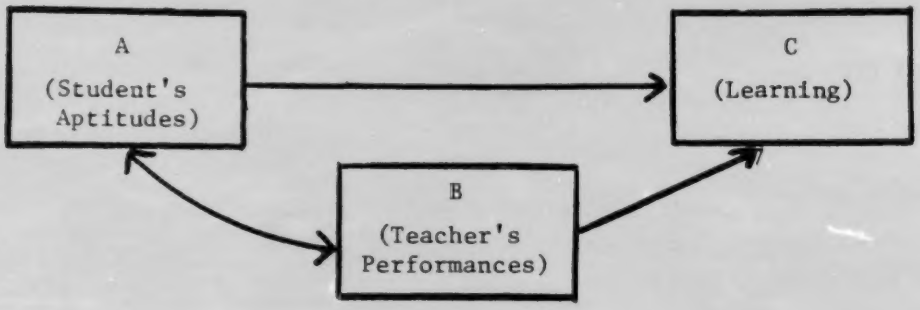
where

y = measured children's learning
x_1 = measured student's aptitudes
x_2 = measured teachers' performances
c = constant

The correlations among the variables x_1, x_2, and y are used to derive the coefficients b_1 and b_2, and the constant c. The relations among the variables is linear. The multiple correlation coefficient is

used to estimate the validity of this hypothesis. An equation of this kind is used to estimate how much of the variation in C, children's learning, is associated with variation in the other two variables. The correlation between A, student's aptitudes, and B, teachers' performances, is also provided in this analysis.

Second, consider by way of contrast, the following structure of hypothesized relations among these variables:[1]



This structure specifies the relations among the three variables. It portrays two kinds of statements, one, that A is prior to and a "cause" of C. This statement is stronger than saying that the two variables are correlated. The predicted causal interdependency among the variables is specified: $\begin{matrix} A \longrightarrow C \\ B \longrightarrow C \end{matrix}$. It is this concept of interdependency that is the structure. The purpose of the methodology used in a study of a structure is to test the validity of the hypothesized structure.

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[1] We use here the previously indicated convention: straight-line arrows indicate predicted causal relations; curved-line arrows indicate predicted correlations.

The second key idea to note is that conceptualizing a structure requires the investigator to make statements about causality. A causal statement says that A is an antecedent of C; that changes in C can occur if and only if changes in A occur; that changes in A will always be followed by changes in C. Similarly, B is an antecedent of C and changes in C can occur if and only if changes in B occur. Thus the investigator is going beyond predicting that A and C, and B and C, are correlated. Such predictions, if they are to be taken seriously, require stronger justifications than predictions about correlations.

Steps in the Use of a Structural Model

The logic of a strategy to investigate the validity of a structure has three parts. We have just described the first part--a concept of this structure must be presented as a set of hypotheses describing the interdependencies among the variables as either causal relations or correlations.

The second part of the strategy is the measurement of the variables in the structure. The requirements for measurement are the usual ones--the measures must be valid and satisfactorily reliable.

The third part of the strategy is that a set of procedures must be selected to test the validity of the predicted structure with the available data. These procedures test the hypothesis that the data are "explained" by the hypothesized structure; that the structure

"fits" the data.[2] The logic of the inquiry assumes that there are orderly relations among the variables. The investigator has hypothesized what the orderly arrangement might be and uses the data to test the validity of this concept.

Thus, the logic of the strategy is, to conceptualize a structure of relations among a set of variables, measure the variables and test the validity of this structural concept. This report describes such a structure and the test of its validity.

The Meaning of Explanation When Using Structural Models

The investigators conducting a study assume that there is a stable set of relationships among the variables to be studied which is to be discovered. The investigator expects to find order among the variables; the minimum expectation is that associations among variables will be found, but there may also be a stronger assumption about the nature of the events being studied. We expect some to have an influence on others. We expect teaching skill to be correlated with children's learning and children's learning to be correlated with other variables. But we also expect teaching skill to influence children's learning. The formal proposition is: when teaching skill is present, children learn more than when it is absent, other things being equal.[3]

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[2] Note that we did not say, "that the data fit the structure." The data are taken as the given (in the logical sense); the data are to be "explained" by the structure. The hypothesis being tested is: if these data, then this structure.

[3] We ignore here for the sake of simplicity the problem of multiple causes. Obviously, some children learn in the absence of teaching skill and some do not in its presence. Other variables account for these cases. "Other things being equal" is the qualifier intended to cover these other cases.

In stipulating a structure to be tested, an investigator is stating his or her predictions about these relations. One or more structures may "fit" a body of data. The goal is to find the "best fit," that is, the most parsimonious and valid "fit." There are relations in these data in the form of correlations, and it is this pattern of correlations that the investigator is attempting to account for in a meaningful way.

The structure is an "explanation" because it describes how changes in one variable may be predicted from changes in one or more variables. It is a strong "explanation" because its formal propositions stipulate causal relations of the "if and only if" form. The structure, therefore, is a theory.

In this study, therefore, we are testing a theory about teaching performances and children's learning. This theory is represented in the diagram in Figure 2.6.

The reader should be aware that we are attempting an analysis here that is different from that typically performed with data of the kind gathered in the Beginning Teacher Evaluation Study. The character of this difference is explained in greater detail in the following section. Chapter 6 presents the mathematical details of the techniques used to test the "fit" of the theoretical structure.

Structural Models and Causal Analysis

We begin this section by discussing the approach to research on teaching with which most readers are familiar in order to contrast

it with the methods of structural analysis. The procedures with which most readers are familiar use an estimation model. This study uses a structural model.

Procedures related to both models use the same kind of data. A data base is first collected by using a variety of measures of variables. The intercorrelations among these variables is the basic information to be used whether one does an estimation-model analysis or a structural-model analysis.

The Estimation Model

An investigator who uses an estimation model is interested in predicting the variance in one or more variables from what is known about the variance in another variable. The most common and best-known example of this approach is the prediction of academic performance measures from aptitude scores. The investigator has at least two pieces of information on each person in a sample of individuals, their academic performance measured in some way, usually grades, and their performance on a measure of aptitude on one or more aptitude measures. Thus, each individual has at least two scores. The correlation between these scores is computed. If certain assumptions are met in the data, the relationship between the two sets of scores may be represented as in the following linear equation:

$$Y' = bX + c \qquad (2)$$

where Y' = predicted score

X = aptitude score

c = constant

This equation is a prediction equation; that is, the investigator may subsequently use it to make predictions from one set of scores about another set of scores. The method may be expanded to include a number of predictor variables. If for example, the investigator had information on aptitude scores and previous grades, linear-regression methods could be used to derive an equation of the form:

$$(3) \qquad Y' = b_1 X_1 + b_2 X_2 + c$$

This equation uses information on both variables, aptitude and previous grades, to make predictions about subsequent academic performance. The coefficients of the X_i's enable the investigator to estimate what portion of the variance in Y' is accounted for by the variance in each of the X_i's.

Estimation models are descriptive-predictive models. The statements derived from them describe the patterns of correlation among the variables and, if these correlations are used to derive regression equations, predictive statements may also be made.

Structural Models

An investigator constructs a structural model to test a theory of causal relations among variables. Hypotheses about specific causal relations are made to construct a particular model. The model is a picture of the predicted causal connections among the variables.

"Cause" is used in these sentences in its traditional meaning. A cause or an antecedent precedes in time an effect or a consequent.

Further, manipulation of or variation in the cause leads directly to a change in the effects or consequent.

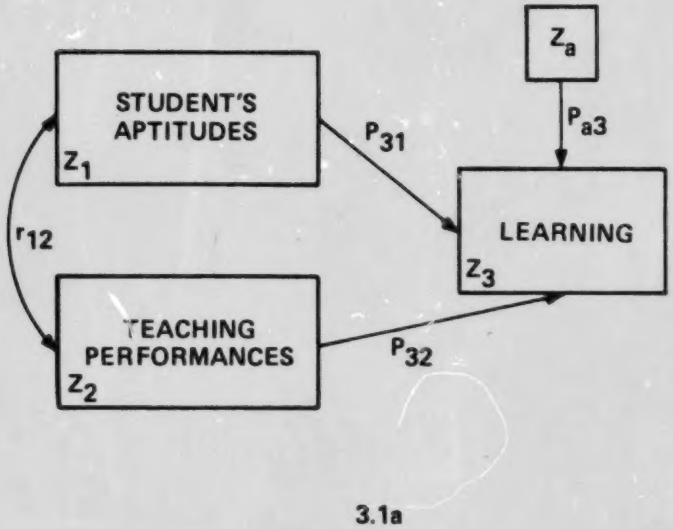
The reader may well ask why, if one has a causal hypothesis, would one not design an experiment in which the experimenter would systematically manipulate the presumed causal agent to measure its effect? As we pointed out in Chapter 1 this procedure is eminently desirable; however, we also pointed out that at the present time we know relatively little about causal relations among the variables affecting teaching performances and children's learning. Also it may not be possible to manipulate in a systematic way a potential independent variable.

The value of a multivariate study of the type employed in this investigation is that inferences can be made about causality which may then be systematically tested by experiments. Another value is that inferences can be made about the magnitude of the influence of "causes" that are not easily manipulated in practice. One cannot easily manipulate aptitudes of students, but we want to know the plausibility of the hypothesis that these factors act as causal agents. In a study of the kind described in this report, it is all the more important to make some attempt to make causal inferences because there are so many variables involved. The study would have less value if we portrayed all the correlations among the variables and reported the amount of variance in children's learning accounted for by each variable.

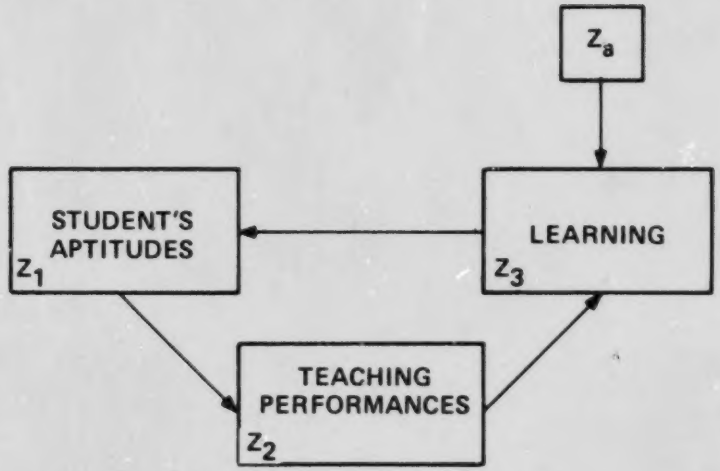
We can now return briefly to our example of the relations among student's aptitude, teachers' performance and children's learning. When we were discussing this example in the previous section, two of these three variables were treated as predictor variables. If we wished, however, to construct a structural model among these variables we might produce a model such as that in Figure 3.1a. A variable, Z_a, that is required to write equations has been included; this variable represents the variance associated with unmeasured variables.

The model in Figure 3.1a tells us we are hypothesizing that student's aptitude and teachers' performances have a direct causal effect on children's learning, and that the critical agents in children's learning are teachers' performances and student's aptitude. (A simplified example is being discussed here. Other factors may influence children's learning, as the model in Figure 2.6 predicts.)

The model predicts a correlation between student's aptitudes and teaching performances. Why is a causal prediction not made? This case illustrates a major feature of causal models. The investigator must in advance predict either a causal relation or a correlation between two variables. The decision should be based upon a conceptualization of the phenomena involved and reflect the current state of understanding of and knowledge about the phenomena. The investigator in principle may select any variable to find out if it acts as a predictor of a criterion. In structural models, on the other hand, a variable is not included unless



3.1a



3.1b

Figure 3.1. Examples of Structural Models Relating Student's Aptitude, Teachers' Performances and Children's Learning

a specific prediction, either causal or correlational, has been made about that variable and some other variable in the structure.

Since aptitudes exist prior to specific teaching performances, one could argue that the performances occur as a consequence of aptitude. The teacher, aware of the student's aptitude, modifies teaching performance with respect to the aptitude. If one believes this argument, then the relation would be as portrayed in Figure 3.1b. But since the direct evidence for this kind of influence of aptitude on teaching performance is very limited, the investigator may choose not to predict a causal relation because the possibility of a causal relation is not sufficiently plausible.

As we pointed out earlier, others will have a different theory of the order or relations among these variables, and may want to indicate other patterns. One could, for example, reverse the straight-line arrows between learning and aptitude, in which case the prediction would be that children's learning directly affects the student's aptitude. Such a model is an entirely different theory. Or, one could design the model as in Figure 3.1b.[4]

The choice of one model over the other, 3.1a vs. 3.1b depends on the conceptual analysis of the phenomena and the interpretation of previous research. In this case, we would select the model in Figure 3.1a, and thereby illustrate a point. Previous work supports the

[4]Special computational procedures must be used with cyclical models of this kind. The reader should be alerted to these quantitative difficulties because cyclical relations of the kind in Figure 3.1b seem to be particularly attractive to investigators of interactive phenomena such as teaching.

prediction of a correlation between student's aptitude and children's learning, and logic supports the prediction of a causal relation. It does not support the prediction of a causal relation between aptitude and teaching performance. Why not predict one anyway and see what happens? One answer to this question can be given by a consideration of the equations that are to be solved in the statistical analysis of the data. We will return to this point later in this chapter and again in Chapter 6.[5] Suffice it to say that the predicted correlation initially serves the purpose that prompted the question.

Another answer illustrates a significant feature of the use of structural models. An investigator does not predict a causal relation simply because he or she thinks one might exist between two variables. There must be some plausible reason for the prediction. In this case, there are conceptual reasons for predicting the possibility but no prior research supporting the plausibility. Clearly the investigator may decide either way. Since predicting a correlation will tell us the strength of the association, and eliminates a difficulty in the statistical analysis, it seems wiser to choose model 3.1a.

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[5] If everything is causally related to everything else in the formal model, the structure is overdetermined and the equations defining it cannot be solved. The investigator must "leave something out" of the structure; that is, some variables will not be related causally or correlationally to some other variables or some must be predicted as correlationally but not causally linked. Figure 3.1a is an example of the latter case, and its equations may be solved. These decisions are part of the process of defining the structure and the reasons for them must also be provided.

The difference between estimation and structural models can be further delineated by describing the mathematical representations of the relationships in the structural model.

Mathematical Equations for Structural Models. Note that in Figure 3.1a each of the boxes has been labeled with a Z, where the subscript indicates the number of the variable. Straight lines have a coefficient represented by the letter p and the subscripts of the numbers of the two variables connected by the line. Curved lines have an r with subscripts of the numbers of the two variables connected by the curved line. The reader is familiar with one of these symbols. The r's are correlation coefficients; the p's are path coefficients which represent the magnitude or "strength" of the causal connection between the two variables. The letter Z is used to represent the standard score form of the variables; thus Z_1 means the students' aptitude scores in standard score form. Z_a is a residual which represents unmeasured variance.

The relation among these variables may be represented by the following equation:

$$(4) \qquad Z_3 = p_{31} Z_1 + p_{32} Z_2 + Z_a$$

and

$$r_{31} = p_{31} + p_{32} r_{12}$$

$$r_{32} = p_{32} + p_{31} r_{12}$$

$$p_{3a} = \sqrt{1-R^2}$$

The solution of these equations enables us to measure the direct contribution of each of the independent variables directly to the

dependent variable, children's learning, Z_3. The path coefficients (p's) are linear functions of the correlation coefficients among the variables. (Solve the above equations for p_{31} and p_{32}.) As we have said before, the methods used in structural analysis rely on the same basic information that is used in estimation analyses.

The path analysis technique, however, has two advantages for structural analysis. Dependencies among variables may be inferred from the path coefficients. In complex models, where variables are linked in chains of causal relations, it is possible to estimate both the direct and indirect effects of variables.

Causal Analysis

In the preceding pages the word "cause" has been used frequently. The reader familiar with the long debate in both the physical and social sciences about the nature of causality is probably questioning the use of this concept, particularly if he or she has learned the maxim, "correlation does not mean causality." In this section we discuss the concept of causality as it is used in this study, and the philosophical and logical assumptions underlying the model that appears in Figure 2.6.

Many believers in the maxim, "correlation does not mean causality," seem to ignore an aspect of the logic of this proposition. The maxim, as everyone seems to agree, means no more than that one cannot draw a valid inference about a causal relationship from the observation of a correlation between two variables. The point,

however, is that an observed correlation by itself is evidence neither for nor against the proposition that a causal relation exists between the two variables. One may take the position that we can never know whether or not the two variables are causally related. If, on the other hand, we take the position that they may be causally related, and that the existence of an observed correlation admits the possibility of a causal relationship between the variables, then the critical question is, how do we determine whether or not the variables are causally related? The problem then becomes one of defining the conditions under which valid causal inferences may be drawn.

In recent years some social scientists have attempted to define the conditions under which valid inferences may be made from observed correlations among variables. Wright, a geneticist, developed the quantitative models that can be used to make causal inferences (1921, 1934, 1954, 1960 a, b). Simon (1952, 1954, 1957) laid out the logical foundations for making causal inferences from correlational data. Blalock (1964) has presented the case for making causal inferences from correlational data. The logical and statistical paradigms presented by Blalock are the models used in this study.

The applied scientist is interested in those events which if modified in some way will lead to changes in other events. In a field of research such as research on teaching, our primary goal is to identify variables which if modified will lead

to significant improvement in children's learning. A long history of correlational studies has produced a body of knowledge which, at least, enables us to identify the major domains of variables associated with variations in children's learning. It is more important, however, to attempt to go beyond identifying covariations tc identifying variables which if modified in some degree would significantly improve children's learning. Therefore, we have chosen to use the logical and statistical paradigms described by Blalock and others as a way of attempting to make causal inferences. We are particularly interested in estimating how much learning depends on teaching skill when all the other factors influencing learning are taken into account.

The Concept of Cause

We assume that causal hypotheses can be tested by following certain logical rules. The philosophical position taken here is that the best the scientist can do is to develop and test hypothetical models of relations among observed events (Simon, 1957, pp. 10-12). We are, therefore, using the word, "cause," in a logical sense appropriate to such hypothetical models.

Everyone intuitively understands the concept of cause. The idea influences our everyday thinking. We act as if there were causal relationships among events. When we turn on the ignition key in our automobiles, we expect certain consequences to occur. When they do not, we search for reasons why they have not occurred by looking for causal agents which are no longer functioning or

for other causal agents which are interfering with the normal functioning of the system. These intuitive and common sense notions of causality embrace the essential attribute of the concept.

When we say that A causes B, we usually mean that changes in A produce changes in B. The change in B parallels or covaries with the change in A. But we say that the change in A is the cause of the change in B when we assume that this change in A produces the change in B. Everywhere we observe teachers teaching and children learning. If we measure carefully enough, we can show that the change in children's learning covaries with variations in teaching. But the question is, does the teaching produce the change in learning?[6] Common-sense assumptions and experience lead us to believe that to some degree the skills of teaching are causal agents of children's learning.

Some confusion in applying this concept of causality may occur when one considers such phenomena as teachers' performances

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[6] Some readers may dispute whether we have sufficient information even to claim that there is a consistent covariation between teaching and learning. We should not be confused on this point by the lack of precise information on what characteristics of teaching are associated with changes in children's learning. Rosenshine's (1971) analysis of the relationship of teaching behavior to student learning does not argue the case that there is no covariation among these two domains of variables. Rosenshine's point is that some categories of teacher behavior relate to student learning, and others do not. There is evidence, therefore, that the two domains of variables covary, even though some of our hypotheses about specific categories in each domain have not been confirmed, and even though the evidence suggests that where covariation has been found, the degree of the relationship is not large.

and children's learning which may seem to have influences on each other. While we accept the notion that a teaching performance may produce learning, we are also aware that the variation in children's learning may produce variations in the teaching performance variable. Thus, it would seem that teaching performances produce learning, and learning influences subsequent teaching performances; or A produces B, and B produces A.

One source of confusion that leads to statements of the character that A causes B and B causes A is the lack of precision in specifying the particular variables under consideration and their sequence in time. In the study of teaching, we should sort out those teaching performances which occur before an estimate of children's learning is made. We may also attempt to find out the degree to which children's performances act as causal agents of teachers' performances, but to do this we again must identify those aspects of children's learning which precede changes in teaching performances. Unfortunately, our observational procedures have been too imprecise to permit such identifications, and therefore, we have not been able to specify under what conditions each variable may act as a cause of the other variable. But this lack of understanding and knowledge should not lead to illogical confounding of the relationships between the two domains of variables.

The importance of clarifying the relations between two domains of variables which may be interactive cannot be stressed too much.

Some readers in studying Figure 2.6 will look for symmetrical relations between variables. Most readers, for example, will assume that there should be a straight-line arrow from teachers' performance to student behavior and that another straight-line arrow should be drawn from student behavior to teachers' performances.

For the sake of simplicity in presenting the diagram of the structural model we have omitted the arrow from student behavior to teachers' performances. Had we included such an arrow, we would have had to separate out several different categories of teachers' performances and student behavior; between one pair the arrow would go from teachers' performances to student behavior; between the other pair the arrow would go from student behavior to teachers' performances. We will discuss these connections in greater detail at a later point.

The preceding paragraphs describe the concept of cause in its logical sense. The practical problem is whether or not it is possible to make inferences about causality using correlational data. Such inferences can be made if we have a set of decision rules which enable us to postulate a causal relation. The following section describes these decision rules.

Decision Rules for Predicting Causal Relations

1. The first and most obvious basis for making a causal inference is that one variable occurs prior in time to a second variable.

For the purposes of discussion here, however, consider that class of teacher performances which are the initiators of actions by students.[7] They occur prior in time; that is, the teacher acts, and his or her actions are followed by one or more actions on the part of the children being taught. A teacher asks a question, the child answers. It is a reasonable assumption that the teacher's question is a cause of the pupil's answer, even though there may be other factors influencing the child's answer. Similarly, teacher's knowledge is an antecedent of specific teaching performances.

2. If previous research or theory predicts that variable A is a causal agent of variable B, then the investigator may use this knowledge to construct causal relations in his or her structural model. Two kinds of research models provide relevant data. Experimental designs where one or more variables have been systematically manipulated are the best source. Structural-models analysis is a second source. Unfortunately, there is a paucity of research on teaching in which such designs have been used; most of the research has used the estimation model. Therefore, although this research will be useful in providing a rationale for a structural model, it will be necessary to use other considerations such as known time-sequences and reasoning of the kind described in the following paragraph to develop a rationale.

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[7] Obviously the relationship is more complicated than this sentence indicates. Some teacher performances are the consequence of the student behavior. Actually we also observed student behavior which initiated teacher actions. In this discussion we are using teacher-initiated actions to illustrate how to make causal inferences.

3. A third method may be used for testing whether or not a causal relationship could exist between two variables. This method is based upon a conception of a "true" and a "spurious" correlation. Assume that we find by measuring two variables, x and y, that they are correlated. The two variables may be correlated because x is the cause of y. If, however, both x and y are correlated with a third variable z, then the correlation between x and y is "spurious" because it arises as a function of the correlation of each variable, x and y, with the third variable, z.

The way to test whether or not the correlation between x and y is "true" or "spurious" is to measure the third variable, z, which might be related to both x and y. The correlation between each of the three pairs of variables is computed, giving r_{xy}, r_{xz}, and r_{yz}. A fourth correlation, a partial correlation, $r_{xy \cdot z}$, is also computed.

If the partial correlation, $r_{xy \cdot z}$ is greater than zero, we can conclude that the relationship between x and y cannot be accounted for solely by their mutual relationship with z. But if $r_{xy \cdot z}$ is zero, that is if the correlation between x and y disappears when the effect of their correlations with z is taken into account, two conclusions are possible: (1) that the correlation between x and y was produced by their respective relationships with z; or, (2) that z acted as an intervening variable between x and y so that x influences z and z in turn influences y. (A third possibility is that there is a fourth variable, w, outside this system to which x, y, and z are related.)

The decision between these two choices can be made only by making a priori assumptions about the causal ordering of the variables. If we cannot make these a priori assumptions, we can only conclude that the variables are intercorrelated and that their causal ordering cannot be identified. If, however, we can make plausible assumptions about the causal ordering, then we can choose between these two alternatives. The following section describes a quantitative procedure for testing dependencies when ordering assumptions can be made.

Quantitative Methods for Testing Causal Ordering

Assume that x, y, and z, are a closed system; that is, no other variables are influencing x, y, or z. The relations among these variables can then be written in the form of the following linear equations:

(5)
$$x + a_{12}y + a_{13}z = u_1$$

$$a_{21}x + y + a_{23}z = u_2$$

$$a_{31}x + a_{32}y + z = u_3$$

These equations say that each variable, x, y, and z, is a linear function of the other two variables. The u term is a term representing errors of measurement. The dependence of any variable on the other two can be shown by transposing the terms to obtain an equation such as:

(6)
$$x = u_1 - a_{12}y - a_{13}z$$

The coefficients in these equations may be represented in matrix form as follows:

(7)
$$A = \begin{matrix} 1 & a_{12} & a_{13} \\ a_{21} & 1 & a_{23} \\ a_{31} & a_{32} & 1 \end{matrix}$$

These three equations represent mathematically the mutual interdependence among the three variables, x, y, and z. Changes in any one variable affect changes in the other two variables. The system is completely interdependent, and no one variable acts as an independent variable with respect to the other two variables.

Suppose we assume that not all the variables directly influence all the others; that is, that some of the variables are in fact independent variables. The mathematical consequence is that we assume that some of the coefficients in the matrix are zero. Let us assume that $a_{31} = a_{32} = a_{21} = 0$. Then the matrix of coefficients is as follows:

(8)
$$A = \begin{matrix} 1 & a_{12} & a_{13} \\ 0 & 1 & a_{23} \\ 0 & 0 & 1 \end{matrix}$$

and the resulting equations are:

(9)
$$\begin{aligned} x + a_{12}y + a_{13}z &= u_1 \\ y + a_{23}z &= u_2 \\ z &= u_3 \end{aligned}$$

Consider this second set of equations. The equation for $\underline{z}$, indicates that $\underline{z}$ is an independent variable within the system; its value does not depend upon the values of the other two variables. $\underline{y}$ depends directly upon changes in $\underline{u}_2$ and indirectly upon changes in $\underline{z}$. The values of $\underline{x}$ depend directly on changes in $\underline{u}_1$ and indirectly upon changes in $\underline{y}$ and $\underline{z}$.

In order to test a structural model, the investigator must solve equations of the form in (5). But to do so, he or she must reduce these equations to the form found in (9). The investigator must transform the matrix in (7) into a matrix such as that in (8); that is, some assumptions must be made so that some of the off-diagonal coefficients in the matrix become zero.

The equations at (5) contain nine variables, the six coefficients (the a_{ij}'s) and three u_i's. Nine more relations have to be established to reduce these equations to a solvable form from which causal dependency may be tested. Six of these, those pertaining to the coefficients, are established by making a priori assumptions such as, $a_{31} = a_{32} = a_{21} = 0$. The assumptions about the a_{ij} coefficients are made by considering time precedence among the variables or other evidence that variable $\underline{z}$ is antecedent to variable $\underline{x}$ or variable $\underline{y}$. Another assumption is made that the unobservable errors (u_i's) are uncorrelated; that is, that the unobservable errors affecting $\underline{x}$ are uncorrelated with the unobservable errors affecting $\underline{y}$; and similarly for $\underline{x}$ and $\underline{z}$, and $\underline{y}$ and $\underline{z}$. In this way, the needed set of equations is reduced from nine to three, and the values of $\underline{x}$, $\underline{y}$, and $\underline{z}$ may be solved for, as at (9).

In the example we have been discussing, $\underline{x}$, $\underline{y}$ and $\underline{z}$ have been treated as a closed system. It is possible that a fourth variable $\underline{w}$ may be influencing $\underline{z}$ and be correlated with $\underline{x}$ and $\underline{y}$; and by extension, any number of other variables may be in the system. Therefore, the structural model should be as complete as possible in terms of the domains of variables that need to be considered if causal relations are to be estimated.

The technique of path analysis provides a mathematical way of representing the linear equations after the assumptions about causality have been made. Decisions must always be made about causal ordering before these linear equations can be written. The investigator may construct a diagram of the kind in Figure 2.6. without drawing straight-line arrows, drawing instead curved-line arrows among all the domains. The next step would be to write equations of the form in (5). Having completed that task, the investigator would then make simplifying assumptions in order to reduce the equations to forms like that in (9).

Another way to proceed is to construct the path diagram as we have in Figure 2.6, which requires the investigator to make his assumptions as he or she constructs the diagram. The next step is then to write the path equations for that structure. This is the procedure that we have followed, and the path equations for the structure will be given in Chapter 6.

Our next step in this chapter is to provide the rationale for the structural diagram in Figure 2.6. This rationale has two parts. First, given a set of domains of variables, the rationale for the causal relations and correlations portrayed in the structure must be spelled out. At this step the investigator makes clear what assumptions about priority in time and other considerations that lead him or her to predict a causal relationship between two variables. The investigator must also explain why correlations are predicted rather than causal relations.

The second step in developing a rationale is to provide the support for selecting the set of domains of variables that have been included in the structure. At this point the investigator is arguing the case that a sufficient number of the domains relevant to the variable have been included so that significant "spurious" correlations have not been overlooked. In practice this means that for every causal relation between two variables there must at least be a third variable which accounts for the correlation between the two variables which are predicted to be causally related or whose influence as an intervening variable can be determined.

Domains of Variables Influencing Student Performance

In this section we describe the rationale for the causal relationships among the variables represented in Figure 2.2 (reprinted here for convenience). Note that one important hypothesized causal

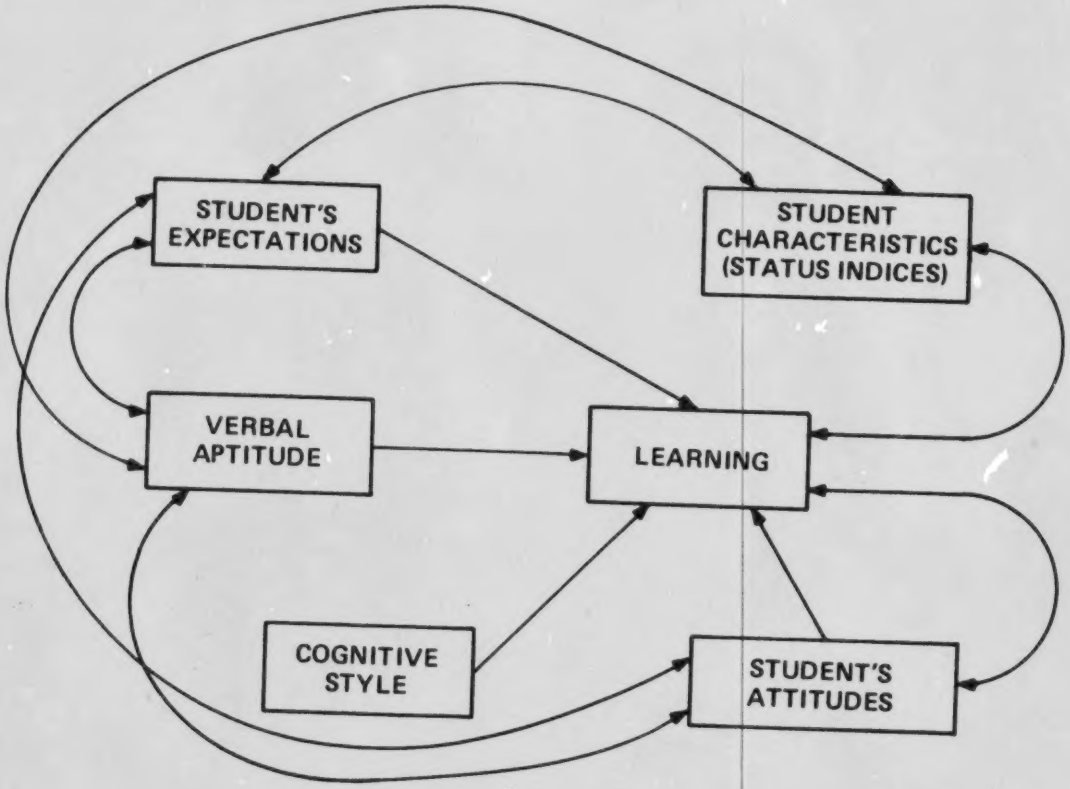

Figure 2.2. A Model of Factors Influencing Student Learning
Conventions: Straight lines indicate hypothesized causal relations; curved lines indicate correlated variables for which causal relations are not hypothesized.

agent is omitted from this diagram, student behavior. We will discuss this variable in this section and refer to the discussion in another context at a later point.

One other aspect of the analysis in this chapter should be pointed out. We are not presenting the case for the choice of particular measures of variables represented in the structure, but in each case we describe the construct defining the domain. We are arguing the case for the predicted relations between the domains of the variables, as defined by their constructs, either because events relevant to a variable in the domain would occur prior to some other dependent variable, or because the body of theory and research related to two domains supports a particular hypothesis. In other words, the argument for causality is an argument for the effect of the class of variables.[8]

Any one measure of a variable, or any one variable within the class, may be more or less strongly correlated with a dependent variable. The argument for a causal relationship is not made on the magnitude of obtained correlations between two variables but on the logic supporting a hypothesized causal connection.

The Causal Influence of Aptitude

An aptitude is a general capacity presumed to exist in an individual because he or she performs a class of tasks skillfully. Aptitudes are usually measured by presenting a person with a set of homogeneous tasks or a class of tasks and asking him or her to perform these tasks.

[8] In previous research measures in each of the domains have been found to be correlated with measures in other domains.

While there are different theories about how an individual comes to have certain aptitudes, a reasonable position is that aptitudes are acquired or learned, even though some genetic or structural base may be required for a person to acquire an aptitude. An aptitude may be thought of as a response repertoire which the person has available to use for specific kinds of tasks and which enables him or her to perform the tasks skillfully. Aptitudes vary in degree and kind, and persons may be described in terms of variations in both the kinds of aptitudes they appear to have and the degree to which they possess them.

Aptitudes are available response systems which may be called upon in a variety of related tasks. They are not merely previously acquired knowledge. It is reasonable to expect, however, that for some tasks a combination of aptitude and previously acquired knowledge is required. The argument for the causal connection is based on the fact that the person enters the learning situation with an aptitude; that is, a set of previously learned responses, available for performing on the new task.[9]

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[9]The argument is frequently made in the psychometric literature that some tests called aptitude tests are in fact achievement tests. The particularities of this argument are irrelevant to this discussion because we are assuming that an aptitude is an acquired set of responses. It makes no difference to the argument that a particular aptitude measure contains tasks like those found in an achievement test. The concept used here applies irrespective of this similarity. In other words, the concept presented here is a generic description of the phenomena subsumed under the label "aptitude." Also, as previously noted, it is irrelevant as to whether or not the degree of aptitude depends upon a genetic endowment. The genetic endowment sets the possibilities for the development of the aptitude, but the actual development of the aptitude depends upon acquiring those responses which manifest the aptitude in skill in performing classes of tasks.

Student Expectations as a Causal Influence on Learning

An expectation is a concept that the person holds about his ability or potential for enacting certain performances. The expectation may be general such as "I am not very smart," or specific, "I have little music ability." An expectation may be thought of as an estimate of how well one will perform a task, or as a prediction about the quality of expertise of this performance. Thus, the young pianist might say when given a piece of music, "I don't think I will be able to play this very well." Expectations are to be contrasted with retrospective evaluations, as when the young pianist says, "I did not play that very well."

It is a reasonable assumption that expectations are acquired from experience. This experience may be direct, as when the person attempts to perform certain tasks and finds that she or he does them well or poorly. It may be acquired in some cases by accepting another person's prediction about how the person will perform. The person then acts as if the expectation had been acquired by direct experience. In either case, the expectation is acquired by experience in and around tasks.

Expectations presumably are stored in memory. A person remembers how he or she has performed on a class of tasks and remembers the evaluations of the performance. When the task is confronted at a later time, the stimuli of the task are likely to evoke the memories of previous performances and the associated expectations about performance.

Expectations act as an orienting variable. Presumably they affect the person's motivation to perform the task and his or her ability to elicit appropriate responses in the task situation. Expectations of poor performance may arouse anxiety, for example, which in turn may lead to inhibition of appropriate responses.

Thus expectations exist prior to task-performances. Expectations probably elicit excitatory or inhibitive responses which facilitate or block performance. It is reasonable, therefore, to consider expectations as a causal agent of learning.

Student's Attitudes as a Causal Influence on Learning

An attitude is a generalized predisposition to prefer A over B, or to like A better than B, or value A more than B. A distinction is sometimes made between attitude and values, the basis of the distinction being that values exist when the person judges something against a criterion. Thus, a person may have a positive attitude towards reading, which implies that he or she likes reading. The person values reading if against some criterion, such as "useful personal development," he or she ranks reading higher than other activities directed to personal development.

In this study we have preserved the distinction between attitudes and values. Attitudes are generalized preferences or states of liking or positive or negative affect toward some object. Values are judgments of worth. We have not attempted to measure children's values because of the difficulties in measuring values, particularly those of young children.

Attitudes are generalized states which lead to motives in the presence of the attitude-object. If a person likes to read, he or she is more likely to be motivated to read on a particular occasion. Since attitudes exist prior to the performance of specific tasks, we expect attitudes to act as a causal agent with respect to learning.[10]

Application to Causal Model

Refer to Figure 2.2. The categories, student's expectations and student's attitude are generalized states which developed out of a person's previous experience. Attitudes, like expectations, are learned. The difference between attitudes and expectations is that an attitude reflects the affective reaction to the task ahead and the expectation reflects the judgment about a person's ability to perform the task.

Cognitive style is a perceptual-cognitive orienting system. Aptitude variables, such as verbal aptitudes represent abilities or capacities or learned responses that the person brings to the task.

We expect expectations and attitudes to be correlated, and therefore, have drawn a curved-arrow to represent this relation. We might also think that cognitive style is correlated with expectations and with attitudes, but the evidence for this relationship is not sufficiently strong to justify predicting a correlation.

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[10] Remember that we are describing the general relation. Attitudes may change as a consequence of experience in learning activities or attitudes may be acquired in new learning situations, but in these cases the changed or new attitude will act as a causal agent.

We expect aptitude to be related to expectations, and have drawn a curved-line to represent this relationship. Cognitive style, on the basis of available evidence, is relatively uncorrelated with verbal aptitude, and therefore no line has been drawn between the domain of Cognitive Style and the domain of Verbal Aptitude.

Thus there are three orienting variables--cognitive style, attitudes, and expectations--influencing learning.[11] We expect these three variables to influence how persons are motivated to perform a learning task, how they perceive the task, and how they organize the processes of responding to and within the task. An aptitude variable is also likely to influence learning because it embraces the kinds of responses that the person brings to the learning task.

This portion of the model does not predict indirect relationships. It is conceivable that expectations influence attitudes which influence learning. We have not made this prediction because we had no way of knowing whether expectations existed prior to attitudes or attitudes prior to expectations. In this case we see no way to make a priori assumptions about causal dependency.

Student Behavior as a Causal Influence on Learning

Student behavior means the observed behavior of the student in the classroom. Obviously there is far more student behavior occurring in the classroom than can be directly observed; the students presumably

[11] The word, "influence," here and throughout the text implies causality.

are thinking as they perform various tasks, but these responses are not available for observation. Actually what one observes in the classroom is a limited variety of responses by the children--they ask questions, they answer questions, they work problems, they read at their desks, they appear to be listening to the teacher, they talk to each other, they move around the room, and they engage in manipulative activities such as writing in work books or on the board, or in moving objects as when they work with Cuisenaire Rods.

In general, we are interested in student behaviors that fall into several classes. First, there are the task-oriented behaviors that may be thought of as necessary if the child is to learn. The child must pay attention when the teacher is speaking, attend to directions on how tasks are to be carried out, attempt to read in the book when the silent reading period has been started, and try to work through an arithmetic problem.

Another class of behaviors is those behaviors in which the child actually makes a response directly related to the kind of response he or she is attempting to learn. Many of these responses cannot be seen. If a child is working on an arithmetic problem, he or she will be performing the steps required to work the problem. The steps required to work the problem are among the responses to be learned, but we see only the work on the child's paper. The teacher may engage in a discussion with a child in which the child is asked to analyze the meaning of a reading passage. The teacher elicits

what the child thinks, proposes alternatives, invites the child to consider and evaluate, and stimulates the child to reformulate his or her conception of the meaning of the passage. Because of the actions of the teacher we are able to observe the child making some of the responses that he or she must learn in order to interpret the reading passage meaningfully.

We would expect both classes of behavior, task-oriented responses and learning responses, to affect learning. We might further expect that involvement behaviors will be the causal agent of learning responses, which in turn will lead to learning. While this theory is attractive, there are too many conceptual and measurement problems involved in sorting out the different kinds of responses to generate adequate data to test the theory.

In the diagram we have combined three kinds of student behavior into a single domain for the purposes of causal analysis and predicted a causal relation of this group to learning. The data gathered by observing pupil behavior, however, have been sorted into three kinds, productive, inattentive and attentive. The first kind, productive behavior, is a sample of learning responses; these are the responses to be learned or elements of them. The second and third kind, inattentive and attentive behavior are involvement or task-oriented behaviors or a lack of involvement in instructional activities. The box, student behavior, in Figures 2.2 and 2.6, includes these three kinds of behavior. We are predicting that each set has a causal influence on learning. But we are not predicing a causal dependency among the three.

The reader may question why student behavior has not been included in Figure 2.2 and why we have not drawn arrows representing correlations between Student Behavior and such other domains as Student's Expectations and Student's Attitude. The data in this study are organized so that we may compute correlations among the variables in these domains, but the reader should recall that in designing a structural model one must take into account both how the variables are to be measured and what kinds of assumptions one is willing to make. It seems unreasonable to assume direct and causal relations between student behavior and student's attitudes and expectations because we cannot possibly sort out their time sequence under the conditions of measurement available for this study.

In measuring attitudes and expectations we are measuring what might be called "molar" behavior, whereas relative to attitudes and expectations student behavior is microbehavior. We simply do not know enough about what we measured when we measured student behavior to generate a prediction about its relation to variables like attitudes and expectations. Therefore, we are reluctant to make specific predictions about the relation of the observable behavior to other domains.[12]

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[12] In thinking about causal relations we had to consider how this behavior would be measured. The universe of the domain of the construct, student behavior, is unknown. We cannot, as in the case of other domains, select a representative measure of the domain. Only one measure, observation, was available. The data from such a measure sample the domain; but what portion is not known.

We return now to a discussion of the last domain in Figure 2.2, Student Characteristics.

Student Status Characteristics

Student status characteristics is a class name for a variety of indices such as the age of the student, sex, socioeconomic background, years in the school, number of schools attended, and similar characteristics. We think of these indicators as measures associated with underlying variables. We know that age is associated with developmental differences in children, but the causal agent likely to be affecting children's learning is their particular stage of development, not their chronological age. In a causal analysis it would be better to use a measure of development to test directly the influence of development on learning. Similar reasoning applies to the other indicators (this point has been discussed in the previous chapter). Therefore, we have drawn curved lines between status characteristics and other variables. We expect the indices to be correlated because the underlying variables are in some way related to children's learning, but it does not make logical sense to treat the index itself as if it were the agent.

We had another reason for not predicting causal relations between this domain and others. The reader will be familiar with the correlations that have consistently been found between these status indicators and such variables as verbal aptitude or measures of learning. But, as Blalock points out, if we use all of these

indicators as variables in the causal regression equations, we may have considerable difficulty in interpreting the results theoretically, even though we may improve our ability to estimate the dependent variables (1964, p. 48). As Blalock also points out, the variables most appropriate for a causal regression equation are not necessarily the same as those that would be best for estimation purposes.

Domains of Variables Influencing Teacher's Performances

We have presented in Figure 2.6 an array of domains of variables related to teacher performances. In the discussion in this section, we are treating teacher performances as a dependent variable. (Figure 2.3 is reproduced here to facilitate reading this section.)

There are methodological and practical reasons for constructing the model in this portion of Figure 2.6 as we have. The methodological reasons relate to an earlier point, that we wish to tap all the potential sources of variation in a variable that we are treating as an independent variable. The practical reasons were to estimate how much and what kind of change in these characteristics might influence the quality of teaching performances.

By including domains of variables related to teachers' performances, we are also able to explore the indirect effects of these domains on children's learning. Previous research has typically related one or more of these domains directly to student learning, and the results have generally proved disappointing. We

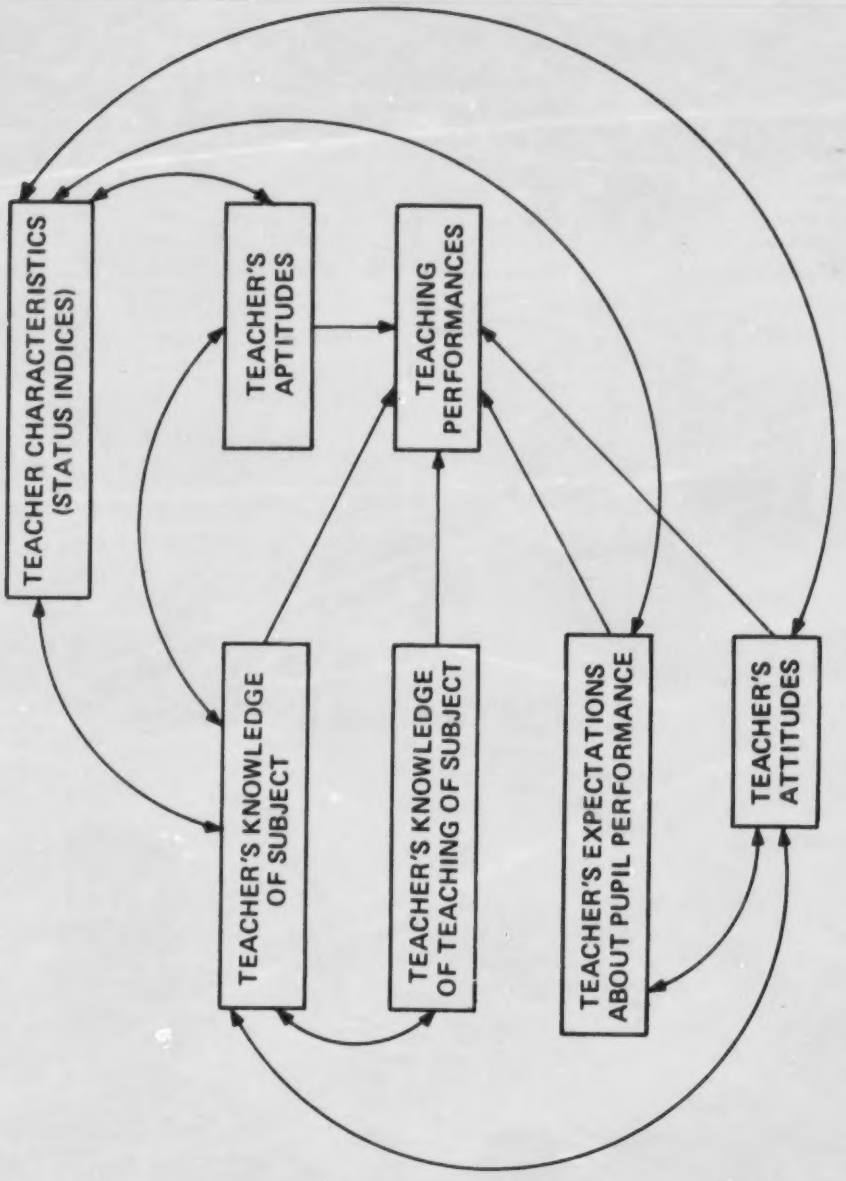


Figure 2.3. Model of Factors Influencing Teaching Performances

suspect the reason that the results have been disappointing is that such domains as Teachers' Status Characteristics are at best indirectly related to children's learning, a relationship that could not be discovered simply by correlating teacher characteristics with children's learning.

The analysis of this model will enable us to determine the extent to which performance is likely to be affected by other factors, and therefore, the likelihood of affecting performance by treating these other factors (the policy questions). Teacher's knowledge of the subject being taught is predicted to be causally related to teacher's performances. Since this is one of such domains predicted to affect performance, we will be able to determine its relative influence on performance. By simulation procedures it should be possible to determine how much of a change in teacher's knowledge will affect teacher's performances in a significant and desired direction.

Teachers' Aptitudes as a Causal Influence on Teachers' Performances

The concept of aptitude has the same sense here that it had when we described the concept with reference to student's aptitude. The reason for including teacher aptitude measures in this study was theoretical. We know that teachers think before, after, and during teaching. But they teach in different ways. Some of these differences are probably related to how they think about teaching. "Thinking" includes different kinds of cognitive and perceptual

processes. Teachers will differ in their skillful use of such processes. Some are more perceptive than others; some reason better than others. These differences are likely to account in part for the differences in teaching performances.

The differences in cognitive-perceptual processes may be thought of as aptitudes, that is, repertoires of responses used in a variety of tasks. They "exist" prior to task performances, and determine how a person approaches and manages a task. They are therefore likely to be among the causal agents that determine the specific task performances which are observed.

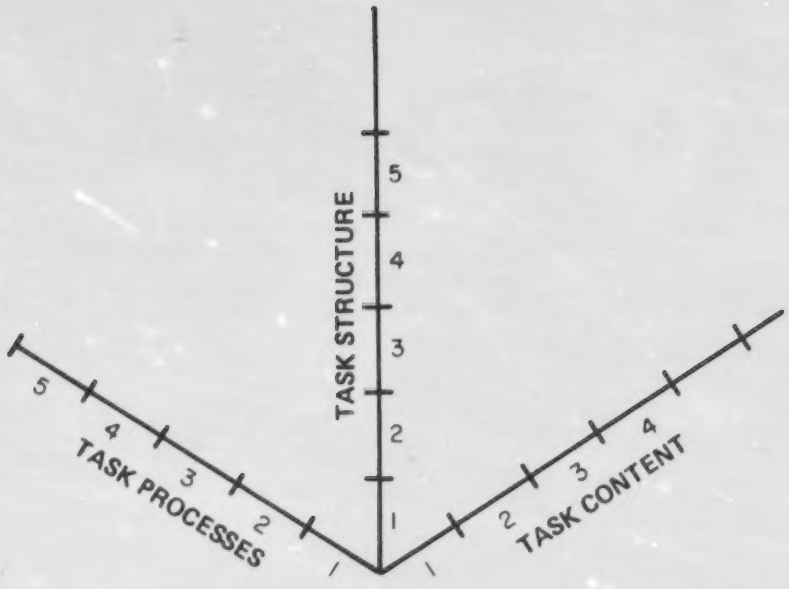
But to use this concept in the analysis of teaching, to conceptualize how aptitudes of different kinds might be related to the task requirements of teaching. These task requirements were conceptualized in terms of three dimensions likely to be common to a variety of specific tasks. Each dimension describes an aspect of a teaching task. The analysis of these dimensions follows. This conceptualization is used to support the proposition that teacher aptitudes causally influence teaching performances.

The teacher may be engaged in several different tasks at the same time, or he or she may engage in successively different tasks within a relatively short period of time. Assume that the teacher is giving an explanation. The teacher is processing verbal material of some kind, or he or she may be using words and numerical symbols in giving an explanation in mathematics. Questioning and answering

in the course of the explanation presumably involve the same kinds of processing functions. But the teacher is also scanning behavioral signs given by the pupils to interpret their degree of attention, interest, and understanding.

In these circumstances the teacher is functioning in several different ways. The teacher is calling upon his or her memory; the teacher is encoding and decoding the symbols as he or she speaks; the teacher is encoding and decoding as he or she listens; the teacher is scanning the students and interpreting their behavior. In general, we may assume that the teacher is using a variety of information-processing aptitudes which depend upon both visual and auditory sensory mechanisms and which are used to process symbolic, semantic, and behavioral information.

Figure 3.2 presents a model of the major dimensions of teaching tasks. This model describes teaching tasks in terms of the content characteristics of the task, the structure of the events of the task, and the processes required of the teacher to organize and manipulate these events. The task structure and task content dimensions describe the characteristics of the stimuli of the task, and the process dimension describes the kinds of psychological processes required of the teacher in responding to the task-situation. Each teaching task involves all three of these dimensions. The content of the task will be specific, for example, semantic; and the organization of this material will also be specific, for example, it may be organized as relations. The processes at a particular moment in time will be specific but may vary across both content and structure.



A. Processes	B. Content	C. Structure
1. Cognitive-Perceptual	1. Symbolic	1. Units
2. Memory	2. Semantic	2. Groups
3. Convergent Production	3. Figural	3. Relations
4. Divergent Production	4. Behavioral	4. Systems
5. Evaluation		5. Theories

Figure 3.2. A Conceptual Model of the Dimensions of Teaching Tasks (Adapted from Guilford 1967, McDonald 1972)

Assume that the teaching task is to provide instruction on a particular decoding skill where the goal for the children is to learn to identify initial consonant sounds. The task involves symbols (content dimension), the initial consonants organized at the level of the units (structure dimension), and the process involved is convergent production (process dimension), a goal-oriented process comprising linearly sequenced steps.

Or, assume that the class is working on the addition of two-place numbers. The numbers themselves are symbols, but the task involves the study of relations among them. The content therefore is semantic in the sense that it comprises analyses of meanings defined by relational statements; the statement $4 = 2 + 2$ is a statement about the meaning of 4 in terms of a combination of other units. The task presumably requires convergent production processes.

Assume that the teaching task is to develop understanding of a reading passage and that the goal is to interpret the passage and to explore its meaning. The material is semantic, and is probably organized at three levels: groups, relations, and systems. The groups are the concepts in the passage, the relations are the connections among the concepts, and the system is the complex of relational statements from which meanings are to be derived. The processes involved are probably a mixture of convergent production, divergent production, and evaluation. The teacher may ask such questions as, "What do we mean by the statement, 'All men are created equal?'" The children must analyze the meaning of the concepts "men" and "equal" and the

relationship between the two concepts. This statement as part of a larger passage must be related to the other relational statements in the passage.

To understand a reading passage the children ordinarily have to be precise on the literal interpretation of the passage, must infer meanings that are implied by the statement, and must make connections between statements to cull the main idea of the passage and the subordination of other ideas to that main idea. The teacher must go through the same steps and use the same processes. In addition, the teacher must think about the instructional strategy which will elicit these processes in the children.

This model is a heuristic model for analyzing the characteristics of tasks involved in teaching. The model itself is a structural model, not a process model. We can describe the major characteristics of a particular teaching task in terms of the three dimensions of this model, but we are not able, by using the model, to be more precise than to assume that, given the characteristics of the stimuli of the task and its goal, certain kinds of processes may be required. Further, we can not tell by direct observation what processes teachers are actually using. At best, we can infer what these processes might be by observing the particular actions of the teacher and the types of responses he or she is attempting to elicit from the student. It also seems likely that shifts may occur within one task from one level to another of a dimension.

What the model enables us to do is to make hypotheses about the kinds of information-processing skills or aptitudes that the teacher

must have in order to carry out a range of teaching tasks. If, to develop reading comprehension, a teacher must first generate and then elicit alternative interpretations of a reading passage, presumably the teacher must have some skill in divergent production and inferential reasoning. Similarly, if one is teaching another person how to interpret a passage, one must be able to model or illustrate for the other person, the kinds of thinking involved in divergent production, and know when divergent production processes are being stimulated in the learner.

We assume that to the degree that a teacher has skill in a particular process, the teacher is more likely to be able to use that process in teaching. If the teacher is not skillful in inferential reasoning, we are not likely to see performances which are likely to require inferential reasoning on the part of the teacher, nor are we likely to see the teacher eliciting inferential reasoning processes on the part of the student.

We are assuming that teaching performance is a combination of cognitive processes involving decisions, and overt actions which we can observe. If, therefore, teaching tasks may be dimensionalized as in Figure 3.2, we can assume that teaching performances will be correlated with particular kinds of aptitudes. Furthermore, given the concept of an aptitude as existing prior to the actual performance itself, we may assume that the aptitudes act as causal agents on the performance.

This causal action probably occurs in either of two ways. First, teachers are less likely to have learned performances requiring

aptitude that they do not have or possess to a minimal degree. Second, assuming that any performance can be learned to some minimal level, we may also assume that we are less likely to see performances for which teachers have less aptitude or that when they do appear in the teacher's repertoire of teaching performances, they are not likely to occur with the frequency or duration necessary to make them effective. These ideas may be stated as a hypothesis which may be represented in the form of the following equations:

(11) $$TP = f(TA_p)$$

where TP = Teaching Performance

TA_p = Teacher Aptitude

or in linear regression form

$$Y_{TP} = b_1 X_{Ap} + c$$

where Y is a measure of teaching performance and X, a measure of aptitude.

Since previous theory and research provide few if any specific hypotheses about the relations between specific aptitudes and specific performances, we have sampled in the domain of aptitude by selecting measures that include tasks at different levels on the content, structure, and process dimensions represented in Figure 3.2. The goal is to estimate the degree to which these measures are correlated with teacher performances and to determine by path analysis the degree to which one or more of these variables acts as a causal agent with respect to performances. The next section describes the thinking behind these choices of measures.

Aptitudes as Information-Processing Variables. An information-processing function in a system is a unit or a subsystem which carries out one or more functions for handling the transmission of information. The concept of information applied to the analysis of psychological phenomena usually means the stimuli to which the person is responding or with which he or she is interacting. Information functions are those systems which recognize and identify the stimuli, organize them, interpret them and transform them in various ways.

A teacher, for example, processes the information (stimuli) that he or she receives from students which comes in the form of movements which can be seen, sounds, words, statements, and other categories describing the stimuli present in every classroom. We assume that the teacher can carry out different functions related to organizing, interpreting and transforming this information into a set of actions which we call teaching performances. Persons differ in their ability to carry out these various functions. We may, therefore, visualize the person as a set of information-processing functions, and may expect to find variability in the aptitude of individuals in carrying out various functions.

This model of aptitude provides a theoretical base for the causal predictions diagrammed in Figures 2.3 and 2.6. Thus the rationale for causal predictions rests on two grounds; one, that aptitudes are prior to performances; the second, that if aptitudes operate as information-processing functions, they must be causally related to performances.

Knowledge as a Causal Agent of Teaching Performances

The teaching performances that one observes in a classroom may be divided into two broad categories, managerial or behavioral control performances and instructional performances. Instructional performances may be further subdivided into:

(1) transmitting performances, in which the teacher communicates information about something or portrays a model of a process to be learned;

(2) eliciting performances, in which the teacher attempts to elicit the responses to be learned; and

(3) feedback performances, in which the teacher provides information on products that a student has developed or on the responses he or she is attempting to make.

Examples of transmitting performances are explanations, portrayals of methods of solutions of problems, statements of fact, and demonstrations. These are performances in which the teacher essentially lays out for the student what is to be learned. Such activities take different forms, varying from extended verbal statements that embody a chain of reasoning to simple declarative sentences that convey information.

Eliciting performances most frequently take the form of questions that the teacher asks, but they also may take the form of presenting students with problems to be solved or materials to be worked on. These performances are intended to engage the student in making the responses to be learned. They may stimulate the child to think or to

perform actions, as when the teacher asks a thought-provoking question or asks the child to read a passage out loud.

Feedback performances usually take the form of providing information on the desirability or the correctness or the appropriateness of a response a student is making or has made. They may be an evaluation of the quality of a product of the student.

It seems obvious that each of these categories of performance presupposes knowledge that the teacher brings to the teaching situation. One cannot explain something one does not understand; one cannot convey a fact that one does not know; one cannot portray a problem-solving process when one cannot enact the process. Similarly, one cannot help another person carry out a process if one does not know what steps are required to carry out that process; nor can one evaluate effectively and provide feedback on performance or product if one does not know the criteria by which the performance or product are to be judged.

Most people agree that simply knowing something does not necessarily mean that one can teach what one knows. But it is equally true that one cannot teach what one does not know. It seems plausible therefore to hypothesize that knowledge of what is to be taught is a necessary and sufficient condition for acquiring or using those teaching performances that act as the causes of the learning.

Note that we do not say that the knowledge itself causes pupil learning but that the knowledge acts as a cause of the teaching performance. It probably does so in either of two ways. The teacher

is not likely to learn teaching performances that depend upon knowledge that he or she does not have. The teacher is also less likely to use teaching performances that require knowledge that the teacher does not have or has to an insufficient degree.

The popular view among some educators seems to be that knowledge bears little relation to effective teaching. The arguments for this position are that research results show teacher's knowledge to be weakly correlated with student learning and that one observes teachers who were untrained in a subject seemingly teaching it well. A third argument is occasionally given that the teacher learns what is to be taught while teaching; so knowledge acquired prior to teaching is not critical.

The weak correlation between teacher's knowledge and student learning is difficult to interpret without information on teaching performances and on a variety of characteristics of the students taught. The design of this study allows us to determine the relative influence of teacher's knowledge in relation to these factors. Further, we are predicting that teacher's knowledge has an indirect influence on learning.

The second argument is difficult to evaluate without information on the character of the teaching itself. We need to know what is left out, what the teacher does not teach. We also need to know what the teacher does teach. Further, we need to know if the students are teaching themselves, or if the teacher learns before actually teaching. This argument seems to be based on the coincidence of a

teacher instructing in areas where the teacher has had little formal preparation but the students appear to learn. Such incidents do not vitiate the argument for the causal prediction made in this study.

In Figure 2.6 a distinction is made between two kinds of knowledge, knowledge of and knowledge about. A person may know mathematics but may know very little or nothing about the teaching of mathematics. Knowledge of teaching a subject area in a curriculum usually includes knowledge of what the expected goals of learning are, the structure and content of the curriculum, the materials that have proven to be useful in the teaching of the subject, and methodologies for teaching that subject.

If the teacher has limited knowledge about teaching, we expect teaching performances to vary in several ways. Vagueness or ignorance about the goals of learning should be associated with the infrequency or omission of performances. Lack of knowledge about resources and methodologies should be associated with a restricted range of performances and less flexibility in coping with learning problems.

If one accepts the necessity of considering this domain of variables, the question is, do we expect the variables in the domain to act as causal agents with respect to teaching performances? A substantial proportion of this knowledge exists prior to the teaching, and certainly to the teaching performances actually observed, and therefore, this category of knowledge may logically act as a causal agent. Further, this knowledge is stored in the memory system and can be retrieved as the teacher organizes specific

teaching performances. Presumably the organization of a performance, whether this organization occurs during the planning process or during the act of teaching, involves drawing upon the memory system for information about appropriate ways to organize the performance. Available knowledge will influence both the alternatives considered and the choices among them. Therefore, we arrive at the same conclusion, that the knowledge is likely to act as a causal agent of the performance.

Teachers' Expectations as a Causal Influence on Teachers' Performances

Teachers' expectations is a concept similar to that discussed with respect to student expectations. But the difference here is that the expectations are those of the teacher about the students. The teacher's expectation is a prediction about how well or poorly each student will perform a task or achieve a learning goal.

The measured expectation may be thought of as an index of an underlying information process which involves sorting and evaluating information about each student. The teacher has several different kinds of data available about each student in his or her class. The teacher usually has available and may use information on previous achievements of the students, such as the scores obtained on standardized reading and mathematics tests taken in the previous year. The teacher may have available tests given at the beginning of the year; and he or she has available all of the evaluative data that the teacher himself or herself has gathered.

The teacher also interacts daily with the students. Each interaction with the student in the course of teaching reading provides the teacher with some information relevant to an estimate of how well the student can read. We do not know whether the teacher translates each such instance into an evaluative judgment, but certainly a series of interactions with the students leads to the formulation of some kind of judgment about the students' capabilities and achievements. Although we do not know how much of the available information is used or how it is organized, we are reasonably certain that teachers make judgments about students' performances which are the basis for predictions about future performances.

These expectations are presumably influenced by a variety of factors. One such factor is the actual performance of a student; other factors may be related to the socioeconomic status or sex or age or ethnic background of the student. The latter relations have been explored in this study and the results of the analyses are presented in a special study which is in Volume 5.

The question of the priority in time of the expectations to the teaching performance is more difficult to estimate, particularly since we do not know whether a particular teacher actually uses information that he or she has available prior to the beginning of the school year in which she teaches the student. Even if we did know that the teachers were using such information, we would not be sure how they used such information.

In this study we measured the teachers' expectations early in the fall of the year of the study. Thus, we have measured

an expectation that existed prior to all of the learning that occurred subsequent to that measurement. The expectation measured at this time is treated as a causal agent of the teaching performances subsequently observed.

One problem with this approach, however, is that the expectations may change substantially over the year. To see if this happened we also measured teachers' expectations in the spring. The other problem is that the expectations may fluctuate so that the teaching performance we observe is a direct product of the expectation at that moment. This possibility could be studied by finding out what the teachers' expectations are on the days they are observed, but this was not possible in this study.

Although it is plausible to assume that expectations may fluctuate, there is no evidence that they do. But this supposition seems to be an implication of data provided by Rosenthal (1968). The Rosenthal data suggest that the provision of new information modifies the teacher's expectation of how the student will do.

Another line of research, however, suggests that stable characteristics of the child such as sex may influence the teacher's expectations independently of performance (Lockheed, 1975). If such were the case, then the expectation is less likely to be modifiable and is likely to act as a prior event in a chain of causality between teaching performances and children's learning.

It should be recognized, however, that there is no way to tell within the limits of the methodology of a study of this kind whether or not the expectation is a relatively stable one or a momentary

fluctuation occurring as a consequence of some immediate event. The reliability of the phenomena is simply unknown, and even two estimates taken at different times tell us nothing about fluctuations in expectations in between. If expectations vary as a function of observed performances of children, we might expect some fluctuation; to the degree that they are influenced by stable characteristics of the children, we expect them to be relatively constant. To the degree that they tend to be established early in the year, they may be less modifiable because the teacher acts in a way that tends to confirm the expectation.

The issue, however, is whether or not we should think of the expectation as a causal agent of teaching performance. If the expectation exists prior in time to a set of teaching performances, we expect it to act as a causal agent; that is, we predict that teaching performances are likely to be modified by the expectation. But even if the expectation has changed or fluctuates, it acts as a causal agent at a given moment in time. The investigator may, however, be using the wrong estimate of this expectation if he or she measured it at an earlier point.

The question then is, how plausible is it that teachers' expectations fluctuate during the school year? We think it not highly likely that teachers' expectations fluctuate enough to say that an estimate of them early in the year is likely to be very inaccurate.

Expectations probably are products of first impressions. It is well known that people quickly form impressions in social situations, and these impressions remain. Social psychologists have dignified the phenomena with the name, "primacy effect." It seems likely that teachers form such impresssions which influence their expectations about pupils.

Then a person is likely to act in a way that confirms his or her expectations. A teacher who thinks a pupil is a poor reader will teach him or her accordingly. The person is likely to respond as he or she is expected to respond; thus the expectation is confirmed.

Both of these ways may seem to avoid conceptions of what is desirable. But we are only saying that these are ways people, including teachers, are likely to act. People are likely to form impressions early in an interaction and are not likely to change them easily. Also we are not implying that these impressions and their correlates in expectations are necessarily inaccurate or harmful.

The Rosenthal (1968) data may be interpreted to support this view of teachers' expectations. The teachers in his study changed their expectations after an extraordinary intervention; others not exposed to the intervention did not. The unusual character of this intervention is sometimes ignored. Teachers do not usually have someone telling them that their pupils' abilities are markedly different from what they thought.

A stronger argument, for both the stability of the expectation and its causal effect, however, can be made from the character of the phenomena themselves.

A measured expectation, as we said above, is an index of underlying information-processing variables. We speculate that these variables are of at least two kinds. One variable operates as a sorting function which acts like a set of anticipatory responses which prepare the teacher to perceive certain stimuli and to ignore others. The second variable operates like a comparison function by which the teacher evaluates information about the child against the prediction of the performance. If we assume that processes such as these are operating and that a teacher's prediction about a pupil's performance is a measure of these processes, then expectations act as causes of performances. The sorting process is also likely to function to select data consistent with the expectation for performance. Thus it tends to confirm the original prediction.

There are two points to the reasoning above. One is that teachers' expectations are more likely to be stable than to fluctuate. The other is that these expectations act as causal agents of teaching performances. The expectation is here conceived of as a psychological set that predisposes the teacher to perceive events consistently with the view of these events organized by the predisposing set. If this is the nature of an expectation, then it is more likely to be stable in the general course of events and will act as a causal agent of teaching performances.

Teachers' Attitudes as Causal Agents of Teaching Performance

Attitude in this context is the same kind of phenomenon as that described when we were discussing student's attitudes. Two categories of teachers' attitudes were measured in this study: specific attitudes towards the teaching of reading and mathematics and general attitudes towards teaching as a profession and towards the environment of teaching. This second category of attitudes is more general than the first category.

The argument for the causal influence of teachers' attitudes is the same as that for the causal influence of students' attitudes on their learning. Attitudes are generalized states which predispose an individual to be motivated in certain ways, and these ways of being motivated are instigators of actions. A teacher who likes mathematics and likes teaching mathematics is more likely to engage in the teaching of mathematics, takes a greater interest in its teaching, and will probably seek ways of improving his or her teaching skill. A neutral or negative attitude towards mathematics, however, will not necessarily lead to the neglect of the teaching of mathematics because other attitudes may intervene, such as the teacher's sense of professional responsibility.

Here again we expect the causal variable to have two kinds of effects. In general, the more positive the attitude, the greater the effect on teaching performances. This effect should be apparent in the diversity and level of skill of the teaching. A moderate

attitude level may not necessarily be associated with less skill in execution but may be apparent in the amount of time expended and the imaginativeness and diversity of the teaching performances. We expect negative attitudes to be associated with omissions of specific kinds of teaching performances, restriction in diversity, and less time spent in the teaching of the subject about which the teacher has negative attitudes.

In general, the effects of attitudes are likely to be apparent in choices and energy expended which are behavioral indicators of the strength of the motivation to act. But, because the observed teaching performances were learned at some earlier point, the teacher's attitude affected that learning, and the result should be apparent in the range of teaching performances used by the teacher and in the skillfulness apparent in these performances.[13]

In the preceding sections we have treated five domains of variables as potential causal agents influencing teachers' performances. Aptitude and knowledge exist prior to the actual teaching itself. Further, they are sufficiently comprehensive in character that we expect them to influence teachers' performances across a variety of teaching situations. Teachers' expectations may be both general and specific. If the teacher is influenced by general characteristics of students, then the expectations clearly exist prior to a particular

[13] But we also expect that in observing many samples of teachers we will not see the full range of performances because those teachers with the most negative attitudes and those whose negative attitudes have inhibited the acquisition of skill will have dropped out of the profession.

teaching situation, and are stimulated by each particular situation. Other expectations, however, are specific to the children being taught, and therefore, are likely to have been influenced by observations of the children's actual learning performances. In either case, expectations act as causal agents influencing performances. Teachers' attitudes towards what they are teaching are likely to have been developed over time and to be relatively independent of the particular occasion of teaching of the subject. Attitudes towards the profession similarly are the products of experience and are brought to the current situation. Attitudes towards the children being taught may fluctuate more and may depend upon particular experiences, but presumably these attitudes are also influenced by prior experiences with students.

The logic of the case for causality of these domains rests upon two arguments; first, that these domains represent characteristics of the teachers which have been influenced by events outside of the specific teaching situation in which the teachers are being observed, that they are the products of experience; and second, that the nature of the processes involved are such that they are likely to be antecedent responses of the actual observed behavior. These domains comprise events occurring "inside" the person which determine how the person perceives and interprets stimuli; therefore, they are determinants of observed actions.

What we miss in a study of this kind is the change in the attitude or the expectation or the knowledge as they vary as a function of new experience. As desirable as it is to obtain this information, we remind the reader that methodology for such studies is not readily available. Repeated testing of attitudes or expectations or knowledge creates an interaction between the phenomena being studied and the testing procedures, which may in itself account for changes in these characteristics.

The practical consequence of not sampling knowledge, attitudes, and expectations regularly is that we may underestimate their causal influence. If these factors have a significant path coefficient so that the conclusion is that they are important influences on teachers' performances, we should also conclude, if we assume that the attitudes may have been increasing as a consequence of experience, that the relationship would be even stronger if we could have measured these changes. If, on the other hand, these attitudes or expectations were becoming more negative, the conclusion is similar. If, however, the attitude had changed to a more positive one, the relation would again be underestimated because the negative correlation would tend to diminish.

The reason for this rather extended discussion of the causal relations is to take into account the sensitivity of many readers to the potentiality for variation in such phenomena as expectations and attitudes, and even knowledge itself. The reasoning here

leads to the conclusion that the causal relationship does not change between the two variables because the independent variable is fluctuating. We are unable to say how this fluctuation might at the time of the fluctuation influence performance. But if we find, for example, a general relation between attitude and teaching performance which is significant, the error in our conclusion might be that we have underestimated the strength of the relation.

Teacher Status Characteristics and Teachers' Performances

The logic of the structural model used in this study should be more apparent now than at the beginning of this chapter. In general, we are always predicting causality between events that are relatively close to each other in time, if an analysis of the phenomena involved suggests a sequence of activities in which one set of events logically precedes another. We expect teaching performances to be influenced by responses that we cannot directly observe -- what teachers call upon from what they know, how they perceive the world, how they perceive the classroom and students, how they organize the information they are perceiving, their expectations about individual children, and similar kinds of responses. When events are more remote from a dependent variable, or when we have only indices of underlying variables, we predict correlations among the phenomena but we do not make causal predictions about them.

An example of this latter case is the category of teachers' characteristics such as their age, sex, previous experience, socio-economic background, and similar factors. In this case we have suggested that such characteristics are correlated with the domains of the teacher's knowledge, expectations, aptitudes, and attitudes rather than correlated directly with the teacher's performances.

We could just as well have drawn a curved line representing a correlation between teachers' status characteristics and teachers' performances. We have not done so because we think the relations are between the characteristics and such domains as knowledge, expectations, attitudes, and aptitudes.

The reasoning underlying this choice is as follows: an index such as previous experience is a very weak measure at best of what the teacher has learned about teaching. It probably also is an indicator of attitudes and expectations with respect to students that have been developed in the course of this experience. Thus, it seems more logical to expect previous experience to be correlated with attitudes and expectations, and to expect attitudes and expectations to have a direct influence on teachers' performances because they are closer to the actual event itself.[14]

In this example the reader has a clear example of the difference between structural analysis and estimation analysis. If we were performing an estimation analysis, we would look for the correlation

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[14] In any case, we will provide the actual correlations among all the variables. A correlation matrix of all the variables must be generated to carry out the analytic techniques of regression analysis and path analysis.

between teacher characteristics and teachers' performances; and determine the percentage of the variance in teachers' performance that can be accounted for by differences in teachers' characteristics. We are instead attempting to establish the causal dependency among variables and are not simply looking for correlations among them. Since we know little about the underlying variables of the measured status characteristics and have not measured them directly, we have no way of making the asssumptions necessary for writing the equations required for the structural analysis.

Correlational Predictions Among the Domains of Teacher Variables

Figure 2.6 includes a number of predictions of correlations among the domains of variables surrounding teachers' performances. The logic of most of these predictions is obvious. Aptitude, for example, is expected to correlate with knowledge because aptitude is a general characteristic of the person that influences all learning situations. Although we expect aptitudes to influence knowledge, we do not have a way of determining their order; nor do we know if the aptitudes measured in this study are likely to be the relevant causal agents of the knowledge measured in this study. The aptitude measures were chosen by considering what aptitude factors might be correlated with teaching performances. We do not predict a correlation between teachers' aptitudes and teachers' attitudes because the basis for making such a prediction in this study is weak. Teachers' expectations and attitudes we expect to be correlated because of the general similarity of the two phenomena. We can

foresee the possibility that this correlation is produced by common elements that appear in both variables. We expect teachers' knowledge of the subject and teachers' knowledge of teaching of the subject to be correlated because teachers take courses that train them on the teaching of subjects that they have studied. Teacher status characteristics, as we noted above, we expect to be correlated with any domain of variables in which the variables are likely to vary with experience and education.

Organizational Variables Influencing Teachers' Performances

Only the causal interdependency among three domains remains to be explained. These three domains are support for innnovation, organizational structure, and principals' and teachers' perceptions of organization. Figure 2.4 has been reproduced for the convenience of the reader. The key variable in this set is organizational structure which is defined in terms of the complexity of the administrative structure and of the instructional system. Formal organizational structure is an arrangement of positions and associated roles such as that of principal, assistant principal, teacher and teacher's aide. Each position is located with respect to another in terms of control over the decision-making processes in the system, communication between positions, and responsibilities.

Schools differ in the number of such positions; some have only principals and teachers; others have principals, assistant principals,

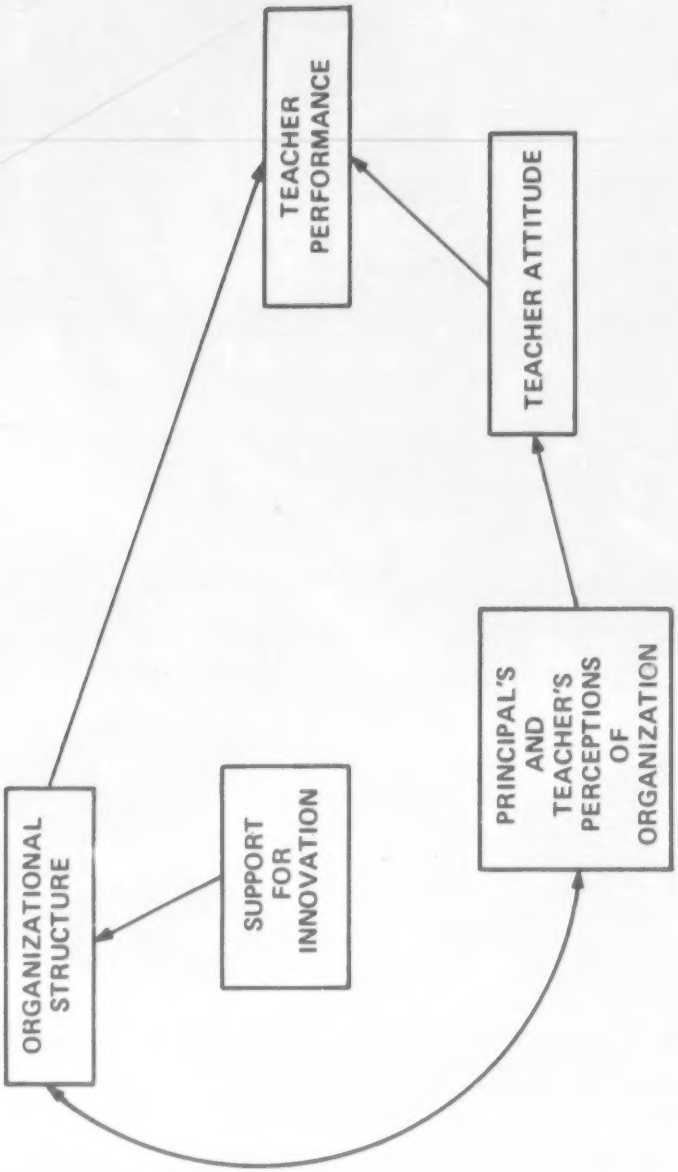

Figure 2.4. Structural Model of Variables Associated with the Environment of Teaching

teachers, aides, and support personnel such as guidance counselors. All systems have rules for who makes what decisions, who administers resources. Communication channels are set up through which information relevant to the organization's task flows. Each system has criteria for evaluating performance within it.

The instructional system itself may have different structures. Teachers may pair off in teams and exchange students, each teacher teaching one subject of the curriculum. Aides may participate in the management of the classroom. The instructional program itself may be complex by virtue of providing different programs for different students.

Why should such arrangements influence teaching performances? Assume that teachers are paired so that one teacher teaches reading and another teaches mathematics to the same students. This arrangement frees each teacher to concentrate on the skills required in the teaching of a single subject. The teacher also acquires more experience by teaching one subject than if he or she taught it while also teaching other subjects. The teacher becomes a specialist of a kind, and therefore, we may see teaching performances under these circumstances that we would not otherwise observe. The team arrangement itself may stimulate the occurrence of certain performances such as greater attention to diagnosing pupil's learning difficulties.

The case for a causal relationship here is a general one and rests on what we generally would expect to happen rather than upon strong evidence that such changes do occur. We do know that, in general, organizational structures set the parameters of behavioral

patterns. Since the structure is set, as it were, and performances occur within the structure, structure is prior to teaching performance. To the degree that it has any influence on performance, we would expect the influence to be a causal one.

Two paths are apparent in the diagram, the one we have been discussing, a direct path from organizational structure to teachers' performances, and another, an indirect path from perception of the organization to attitudes to performance. We have already explained why we expect attitudes to influence performance. In this part of the diagram we are assuming that teachers' attitudes are also influenced by their perceptions of the organization in which they work and that these perceptions will influence their attitudes. The way a person perceives an organization influences the way a person feels about the organization, which in turn influences how he or she acts within the organization.

We have not drawn a straight-line arrow from organizational structure to the domain of perceptual variables because we find it difficult to identify which of the two domains of events is prior in time. Arrangements such as team teaching may influence a change in the organization which in turn influences how the teachers perceive the organization. Since we had no way of knowing the order of events, we have not predicted a causal relation, but we expect a correlation between them.

Support for innovation represents a domain of variables that is remote from the other domains portrayed in Figure 2.6. The school board or superintendent support, promote, or initiate innovations

of one kind or another. Even if the idea for the innovation comes from the principal or his staff, the processes of implementing the innovation must begin with the decision of the superintendent or the board to implement the innovation. Therefore, this kind of support is expected to have a direct effect on the organizational structure; more personnel may be provided, thus increasing the complexity of the organization; or more programs may be initiated, thus increasing the complexity of the instructional system.

The logic of this portion of the diagram is that if support for innovation is provided, then changes will occur in the structure. These changes will directly affect the teachers' performances and be related to changes in perceptions of the organization which in turn will affect teachers' attitudes which in turn will influence teachers' performances.

In considering the causal model represented in this portion of Figure 2.6 it will be useful to the reader to be alert to the difficulties in causal analysis that occur when operational meaning is not given to specific terms.[15] The reader will think of several different forms of support for innovation. This support may take the form of verbalized encouragement, or the provision of resources such as planning time, the active seeking of funds to support the innovation, or the allocation of available resources to the innovation. All of these actions may be called support, but obviously some are

[15] In other sections the case for a causal relation has been made on the basis of the concept of the domain. When there are different meanings associated with the label of the domain, different predictions might be made for different meanings. Therefore, we have provided here the operational meaning of support for innovation used in this study.

more directly related to the initiation of an innovation than are the others. In this study we have used the allocation of resources as the criterion measure of support for innovation. The reader should also recall that organizational structure includes two kinds of measures of organizational complexity, one pertaining to the structure of the organization, the other pertaining to the diversity of instructional programs. Support for innovation may change either or both of these two aspects of organizational structure.

A problem in the causal argument presented here is that the organizational changes may not in fact be sufficient to shift teachers' performances in any significant way. In a particular case, the precise kind of organizational change may not lead to changes in teachers' performances; or teachers may continue to teach in the new organizational system as they have been teaching. But if we are to take the position that teachers will not modify their teaching performances when the organizational structure changes, we are simply predicting how the test of the causal hypothesis will come out.

Characteristics and Major Assumptions of the Structural Model

In the preceding sections we have been presenting the logic underlying the structural model that has been tested in this study (Figure 2.6). It would be useful to step back from that model at this point and consider its major characteristics and assumptions.

Major Assumptions

The major assumptions of the model are most easily represented in a series of equations that portray the functional relationship among the variables. These equations summarize the major relations in the model:

(9) $L = f\ (SB_e, SE_{xp}, V_{er}A_{pt}, C_{og}S_t, SA_t)$

(10) $SB = f\ (TP)$

(11) $TP = f\ (TA_t, TE_{xp}, TK_{te}, TK_s, TA_{pt}, O_rS_t)$

(12) $TA_t = f\ (TP_{er}O_r)$

(13) $O_rS_t = f\ (S_{up}I_n)$

For convenience in referring to Figure 2.6 the first letter of each word in each box in Figure 2.6 is used as the symbol, sometimes with one or two of the next letters as subscripts; for example, Student Behavior is designated as SB; Student's Expectations, SE_{xp}; Verbal Aptitude $V_{er}A_{pt}$; Cognitive Style, $C_{og}S_t$; Student's Attitude, SA_t; Teachers' Performance, TP; Teachers' Attitude, TA_t; Teachers' Expectations, TE_{xp}; Teachers' Knowledge of Teaching, TK_{te}; Teachers' Knowledge of Subject Taught, TK_s; Teachers' Aptitude, TA_{pt}; Organizational Structure, O_rS_t; Teachers' Perceptions of the Organization, $TP_{er}O_r$; Support for Innovation, $S_{up}I_n$.

There are two major dependent variables in this study, the most important being children's learning. Equation 9 presents the functional relationship between learning and the other variables.

The first question is whether variables may be missing that one might expect to be related to children's learning. The model as such

does not include variables which describe the group atmosphere or the social dynamics of the class. We know that group attitudes toward school and the subject being taught are likely to influence how involved the children become in the learning and each child's attitudes toward learning. We also know that the children like or dislike each other, so that a particular child may seek and receive psychological support from other children, or a child may be a "loner" and this status may inhibit performance. Such variables have not been measured directly. We are, however, assuming that the domains of expectations and attitudes as measured reflect these variables. We expect variables such as the class level of expectation about performance and the class attitude towards reading to act as causal variables influencing individual children's expectations and attitudes about performance.

Similarly, it could be argued that such factors as the classes' general expectations, attitudes, behavior and aptitude will influence student behavior. A more elaborate causal model would indicate that these components act as causal agents on student behavior. The argument here is that other variables representing the characteristics of the class are reflected in the measure of each child's attitudes, expectations, aptitudes and behavior. If this model describes relations adequately, more refined models may be developed and tested.

The second major assumption pertains to that portion of the model that relates teacher performance to student behavior

(equation 10). Consider the major kinds of activities in which the teacher engages in teaching. A teacher plans the instructional program, organizes and reorganizes the context in which instruction is carried out, chooses the methods of instruction, monitors the instructional activities, and evaluates the effects of instruction. Included within each of these major categories are sets of particular performances, each resting on a complex of decisions that the teacher has presumably made. Given this array of events under the direct control of the teacher, it is reasonable to conclude that what the teacher does is the principal causal agent in the relation between teachers' performances and student behavior.

This statement does not imply that student characteristics or student behavior does not influence what a teacher does. Obviously the teacher who is planning and organizing instruction takes into account the characteristics of the students. As the teacher interacts with the students, for example when the teacher is asking questions and the students are attempting to answer them, the teacher's specific performances will be modified by how the students are responding. Also some actions initiated by the students lead to specific responses by the teacher; if, for example, the student is not attending to the task, or engages in a social interaction that is not relevant to the task, the teacher is likely to respond.[16] In

[16] There are those instances where the teacher has lost complete control of a class, and where student behavior is in fact the primary cause of the teachers' performances. This type of case needs to be studied as a special phenomenon. The fact that such cases occur does not argue against the general direction of causality hypothesized in the model.

ordinary circumstances, the sequence of events suggests that the teachers' performance is the primary causal agent (therefore, equation 10).

One other major assumption needs to be pointed out to which previous reference has been made. We are assuming that the context in which the teacher teaches sets parameters on teachers' performances (equation 12 and equation 11). In general, we expect the teacher's performances to be more influenced by the immediate situation than by the general context of teaching, but we assume that the latter has set boundary conditions on the kinds of performances that are likely to occur. An alternative view is that the actions of individuals in the institution determine how the institution is structured. This is an implausible explanation of school organization; instances of this relation are likely to be exceptional cases. Although this aspect of teaching is relatively unexplored, it seems useful to make an assumption which has generally proven to be valid in the study of a wide variety of roles.

The assumptions made in designing this model are derived from the principle that the model should reflect the general case rather than the exceptions or the interactions that occur at a microlevel. The structural model in Figure 2.6 presents, therefore, the general case; that is how we expect events ordinarily to be related.

Some readers will have difficulty in accepting the general model because they will want to build into it all the possibilities for interactions across all situations. We think it a better strategy

to test the general model, particularly since there is so much disagreement at the present time about the relative influence of the domains of variables included in the model. Correlations have persistently been found between socioeconomic factors and children's learning. Socioeconomic factors are used by some people as an explanatory construct; others point out that these factors account for a substantial portion of the variance in children's learning and believe that school and teacher factors account for a relatively small portion of this variance (Jencks, 1972). Variables such as teachers' knowledge have generally been found to have relatively weak relationships to children's learning. Teachers' expectations about pupil performances have been treated by some as if they were the most important variable influencing children's learning. But there are few studies that have included many different kinds of variables in their analyses. Therefore, this study presents an opportunity to determine the relative influence of a variety of variables on both teachers' performances and children's learning. It seems sensible to test the general model in order to determine which next steps would be most profitable in furthering our understanding of the relationships among these variables.

Representativeness of the Domains of Variables

In principle, an infinite number of variables might be interacting with the dependent variables in this study. An investigator cannot argue that he or she has sampled all the relevant domains within the

limitations of a particular study. The best the investigator can do is to estimate how much of the variance is accounted for by unmeasured variables. Practically, the question needs to be asked if a sufficient number of the variables believed to be related to teachers' performance and children's learning have been sampled so that causal inferences are likely to have validity.

Brunswick (1952) approaches this problem by developing the idea of a representative design. Brunswick points out that our understanding of how a person performs in a situation depends upon our ability to analyze the actions of this person in an environment. This idea leads to the concept that in order to understand how a person's behavior varies it is necessary to sample the ecology of situations in which the person may be located.

Applying this concept to children's learning, the investigator should construct designs which sample a variety of situations in which children may learn. In this particular study, the situations in which children may learn are confined to those that occur in classrooms in schools. Therefore, the question is, is the ecology of situations in which children may find themselves in classrooms in schools adequately represented in the design?

There are two sampling questions which must be considered to answer this question. The first is whether or not the variables sampled represent the kinds of situations in which a child is likely to find himself in classrooms and in school. What are these situations like? Ordinarily the child learns in a group with other

children, and the instruction is mediated by a teacher whose actions set the particular conditions for learning at any given moment. This context varies in numerous ways, first in terms of the characteristics of the teachers to whom the child is exposed. These teachers differ in terms of their knowledge, aptitude, attitudes, and expectations about children. They vary in characteristics related to their background. Personalities differ in some respects. As can be seen from Figure 2.6, provision has been made for sampling a variety of situations in which the differences among the situations are defined by differences among the teachers. Thus, any two classrooms may differ by the way the teachers teach, by what they know, by their attitudes, expectations and aptitude. By sampling a variety of characteristics of teachers we sample the ecology of situations in which the child may find himself or herself.

These contexts also differ in terms of the characteristics of the children. The children within each class differ in background, aptitude, previous learning, attitudes, expectations, and behavior. The classes are also a sample of a range of differences across groups of children because they are located in different schools and communities.

Similarly, since the immediate context of learning, the classroom, may be influenced by the characteristics of the school, we sample the ecology of <u>school situations</u>. We do expect teachers' and principals' perceptions of the organization to vary from one

school to another, and attitudes of the teachers to be related to these differences in perception. Thus each school will have people who think differently about that school than the staff in another school thinks about their school. Similarly, the structural characteristics of the schools will differ, as well as the support base for different kinds of organizational arrangements.

The problem in constructing a representative design in this sense of sampling the ecology of situations is that we have limited knowledge about the variety of situations in which the child may be. We have more confidence in the representativeness of the domains representing teacher characteristics and student characteristics than we do in the representativeness of the domains of differences among schools. But we believe that enough is known about teaching situations to suggest the reasonably strong possibility that the domains of teacher and student variables sampled in this study are a representative sample. We are less confident about the representativeness of the domain of organizational variables.

The logic of representative design is that the investigator is most likely to discover the variety of influences on a person's behavior if the researcher samples the variety of situations in which the person will find himself. To construct a representative design one must sample the range of potential causes. The argument that we have sampled this range with respect to teaching situations has been made above, and we have noted that where particular variables have been omitted from the formal model, they are represented in their effects on other variables.

The Evidence

One of the bases for postulating causal relations is that prior research has indicated the plausibility of such a relation. But the problem in providing a rationale from previous research for our structural model is that it is difficult to make inferences about causality unless factorial experimental research has been done. Obviously, many of the variables included in the structural model are not easily manipulated; therefore we find a paucity of experimental designs in which these variables have been systematically manipulated. Furthermore, relatively few studies have investigated the relations between variables such as teachers' attitudes and teachers' performances, or teachers' expectations and teachers' performances. The typical pattern of research has been to relate one or more teacher characteristics, such as attitudes or expectations, to children's learning, bypassing the teacher performance variable.

One other prefatory comment needs to be made about the support for the structural model that can be found in the research literature. This support is at best mixed. Where formal experimental studies have been conducted, the results frequently are contradictory. A relevant example is the work on the relation between teachers' expectations and the amount of praise that a teacher provides for students. Dunkin and Biddle's recent review of the literature on this relation has found that in four experiments in which expectations were manipulated, no relationship was found; in two other studies, one found a relationship and the other found the relation only in

connection with the race of the student (Dunkin and Biddle, 1974, pp. 129-130). Of two field surveys one found a relation, the other did not. Thus, of eight studies, three found a relation and five did not. The results certainly are not strong. But, if we are to predict a relation between the two variables expectation and performance, the nature of the phenomena involved require a causal prediction.

Another problem is that reviews of this literature, such as that of Rosenshine (1971), consider all representatives of a variable within a category equivalent; the construct validity of the measures is assumed. Thus teachers' attitudes embrace attitudes from those of teachers in the elementary school to teachers in the secondary schools (p. 212), and include attitudes towards the subject being taught, attitudes towards teaching it, and general attitudes such as those measured by the Minnesota Teacher Attitude Inventory. Such differences in the variable ought not to be ignored. But for our purposes we regarded each such measure as a sample of a multidimensional complex, and if some measures in the domain correlated with a consequence, we regarded this as sufficient evidence to include the domain in the structural model.

The third problem is the one that this study attempts to resolve. Many studies are analyses of two or three variables. When variables that <u>may</u> be correlated with either the independent or dependent variables are not measured, it is impossible to estimate the meaning of a "weak" relationship that has been found. The

relation may disappear when the two variables found correlated are related to a third variable; or we may find a new structure of relations. We have treated "weak" relations as sufficient evidence that the domain may be a set of relevant variables.

The conclusion to be drawn from the above discussion is that the research literature is of relatively little help in establishing a firm foundation for the structural model. If it were a solid foundation, there would be no compelling reason to use this model; we would already know more about the causal relations among variables then we know at present. On the other hand, the lack of substantive conclusions in the literature has led many people to believe that research on teaching is essentially a hopeless enterprise. This counsel of despair seems premature.

The evidence cited here, therefore, is evidence that the domains included in the model are likely to be sources of variables which will be related to each other. The evidence, however, is mostly evidence for covariation. The arguments for causality rest primarily on the analysis of the nature of the variables involved and a theoretical conception of their probable ordering in the world of events.

For the purposes of this study it seems pointless to make the detailed kind of review that is readily available in such sources as Rosenshine (1971), Dunkin and Biddle (1974), and the two editions of the Handbook of Research on Teaching (1963, 1973). We will summarize the results of these comprehensive surveys in the sections

below. We will follow the procedure used in the first portion of this chapter by beginning with the dependent variable of student learning and considering the variables related directly to it, and then move to the teacher performance variable and consider the variables related to it, reviewing literature on the predicted relations.

Student Aptitude and Learning

If there is one prediction that has an extensive body of research supporting it, it is the prediction that student aptitude measures correlate significantly with achievement measures of learning. As Bloom has noted, "the relationship between a general index of intelligence and an over-all performance on a battery of achievement tests approaches unity at the elementary school level" (1963, p. 383). Furthermore, the various measures of general aptitude tend to be highly correlated, so that the reference to "intelligence tests" applies to a wide range of measures of the same character, such as measures of verbal aptitude.

Cognitive style in this study has been separated out in a special domain because it is not really an aptitude measure like a verbal aptitude measure or other more familiar measures of aptitude. Previous research on cognitive style does not provide a firm basis for predicting a relationship between learning as measured by achievement tests or similar measures and cognitive style. The theory underlying this variable, however, supports the plausibility of finding such a relation (Witkin, 1973).

Stude. 's' Expectations and Learning

It is difficult to demonstrate a direct causal connection between expectation and performance or learning. Careful experimental manipulation is required to demonstrate the causal link. Sears (1941) designed an experiment in which children's expectations were elicited before two successive performances. First children were selected for the study who had differed in their success in reading and mathematics. As each child was asked to perform a series of reading and arithmetic tasks, he or she was also asked to estimate the time he or she would take to complete the next task in the series. These estimates represent the child's expectation about performance. The children who were previously successful (prior to the experiment) were more realistic in their estimates; the children who were less successful were less realistic (that is, their actual and estimated times differed considerably). Some set the estimates obviously too high (that is, they expected to be quicker); others set them too low (they said they would take longer than they actually did). It is a reasonable inference that previous experience affected these predictions. But the "unrealistic" group was obviously setting the estimates on the basis of factors other than objective judgments about previous performance.

The experimenter evaluated the performance for each child after all the tasks were completed. Some children were told they were very successful; others were told they were not successful. The

children were then asked to estimate how they would do on a new set of tasks. The "realistic" children moved their estimates up if they had been told they had been successful; down, if they had been told they were not. They were "realistic" in adjusting their estimates. Those children who were unrealistically high originally kept their new estimates unrealistically high. The unrealistically low group moved their estimates up or down depending on whether they had been told they were successful or not, but always kept their estimates below their actual performance level.

This study illustrates that expectations vary as a consequence of being evaluated. But this variation does not alter the character of the expectation prior to the evaluation. New information is assimilated into the old expectation so that the old expectation is essentially unchanged. Those who were realistic adjusted their specific estimates but they were still realistic. The unrealistic children kept their expectations too high or too low. Thus the expectation seems to be a fairly stable phenomenon.

The evidence for expectation affecting performance causally came from observing how the children approached the problems. The realistic group was goal-directed and flexible while working on the tasks. The high unrealistic group was also goal-directed but relatively inflexible. Objective success did not bring relaxation and objective failure sometimes produced apathy. The low unrealistic group was also goal-directed but the goal seemed to be to perform well enough to make sure their performance was always better than their estimate.

These results are particularly interesting because they illustrate the ways in which expectations affect performance. The performance itself obviously is influenced by the child's available knowledge and skill. But expectations affect how the child approaches the task and how he or she is affected by task performance.

The data support our prediction of the causal influence of expectation on learning. Systematic studies of such phenomena appeared in the literature under the label of level of aspiration (K. Levine, et al., 1944). The conclusions of this work remain unchanged as more recent reviews and experiments show (Finn, 1972; DuCette, et al., 1972).

We have found sufficiently strong support for hypothesizing causal relations in two areas, student expectations and verbal aptitude. The prediction for cognitive style rests essentially on the logic of the conceptual model of cognitive variables and the fact that cognitive style has been found to be related to other variables in situations in which one can assume that perceptual-cognitive processing is a relevant or critical factor.

We have not reviewed the literature on students' attitudes for two reasons: first, the literature is a conglomeration of studies, many of mediocre value, a substantial number having been performed with older students. Second, the literature is so diverse that one is bound to find correlations simply by virtue of the fact

that so many studies have been done. The literature is conceptually and methodologically unsophisticated, and using it as support for a prediction seems to be stretching a point.

Neither have we gone into the literature on student status characteristics. The literature on the relationship of such factors as socioeconomic status is well known (Coleman, 1966). It is also well known that the literature does not show relations between sex of student and achievement measures of learning because items that produce such differences have long since been removed from the achievement measures. Our student aptitude measure is not sophisticated enough to pick up the types of sex differences that have been found (Maccoby, 1966).

The effects of student behavior on student learning are largely matters of speculation rather than of direct observation and measurement. Therefore, the case for a causal relation to learning rests on the conceptual analysis previously given.

The reader should be aware that we have included variables because the logic of their inclusion makes sense. We cannot honestly say whether or not we would have included these variables if a relationship had never been found between a variable and a consequence. Given the quality of some previous research, we probably would have included a variable, even though it did not look particularly promising, because the logic of the model requires its inclusion. Also a complex structure, such as the model, may reveal the variable's true significance in terms of its relations to other variables even though it itself may never been found to be directly related to a dependent variable.

Teacher Performance, Student Behavior and Learning

Major reviews by Rosenshine (1971) and Dunkin and Biddle (1974), as well as an updating of the Rosenshine review by our project team (Potter, et al., 1973) say about everything that it is possible to say on the relations among teacher performance, student behavior and learning. This literature is mixed, as the reader might expect.

Rosenshine, who considered only studies which used pupil growth as a criterion, summarized his analysis of the literature by stating that approximately ten teacher performance variables "show promise" (1973). Dunkin and Biddle used a broader range of criteria by including both achievement gains and growth in attitudes. Some idea of the state of the literature can be obtained by counting the number of significant changes found related to teacher performance variables in the summary of results that Dunkin and Biddle present in their Chapter XI. We provide here a sample of those summaries.

Below are listed seven categories of teacher performances. After each is listed a ratio, the numerator of which represents the number of studies in which positive results were found either in terms of achievement gains or growth in positive attitudes, and the denominator of which represents the number of studies that were conducted in which a pupil achievement or growth in attitude criterion was used.

1. Teacher indirectness - 31/53 (p. 361)
2. Teacher praise - 6/23 (p. 365)
3. Teacher acceptance of pupil's ideas - 10/16 (p. 365)
4. Teacher criticism - 13/24 (p. 366)

5. Teacher talk - 6/13 (p. 370)
6. Teacher questions - 2/14 (p. 370)
7. Teacher lecturing - 1/1 (p. 370)

It should be remembered that these results summarize positive changes in both achievement and attitudes. They can be interpreted in either of two ways. The results are promising in that there is sufficient consistency to indicate that some teacher performance variables are likely to be associated with pupil achievement. Or, the results are relatively weak given the strength of the theory and logic that support the relationship between these particular teacher performance variables and outcome measures.

For our purposes these results constitute sufficient evidence to support the notion that teacher performance variables are likely to be a causative agent in pupil learning. The problem, however, is to sort out those which have a direct influence on pupil achievement from those which have an indirect influence. The specific hypothesis that teachers' performances affect attitudes and these in turn are likely to affect learning can be tested directly in this study. There is sufficient evidence to indicate that some teacher performances may have a direct effect upon attitudes, though the studies in which effects were found on attitudes but not on achievement are evidence contradictory to the general hypothesis.

Teacher Characteristics, Aptitude, Attitude, and Knowledge

These four domains of variables are considered together in this section because the general conclusion from previous research on them is essentially the same for each of the domains. Research in these

domains is a vein that is no longer being mined with the same vigor and interest that characterized work in these areas about a decade ago. With the publication of the first Handbook of Research on Teaching (1963) research of significance in this area began quickly to diminish, largely because of the excellent summarization of approximately 50 years of previous work by Getzels and Jackson (Chapter XI). As the authors repeatedly point out, research in these domains has been particularly difficult to interpret for a variety of reasons, and further, the criterion against which such characteristics were measured seemed to be insufficiently precise to generate meaningful interpretations. The major study of that period was the one undertaken by Ryans (1960), and in terms of both its comprehensiveness and quality, it must be regarded as a reasonably definitive study of variables in these domains.

One fact was consistently found through most of these studies, particularly that of Ryans. Differences were consistently found among groups of teachers. Elementary teachers differed from high school teachers, older teachers from younger teachers, male teachers from female teachers. On any measure of teacher characteristics sufficient variation was found to indicate that within a sample of teachers variations could be found on variables believed to be significant. These obtained relations cover such a variety of differences, it makes little sense to exclude these domains of variables in a structural analysis of the type undertaken in this study. The results of previous research cannot be used, however, as firm support for predicting causal relations.

While one can make a logical, conceptual case for the relation of teachers' knowledge to teachers' performances, the evidence supporting such an assertion is relatively weak. Quirk (1972), in a comprehensive review of the use of one instrument that has been consistently used to measure teachers' knowledge, found that at best this measure correlated on the average at about .30 with criteria of teacher effectiveness. Dunkin and Biddle at several places in their analyses of research on teaching point to the fact that specific training programs improved teachers' performances in classrooms in terms of the training criteria, even though this training has not always been shown to be related to improved student learning. Such data suggest that if educational and training programs were improved by using the results of such studies, one might find relations between student learning and teacher performances in the classroom.

The following reasons support the inclusion of these variables when one uses the evidence on them now available in the literature. There are enough findings of relations to suggest that one is likely to find relations if greater precision of measurement is used and if the relation is conceptualized more precisely. Further, the inclusion of such variables is important in a structural analysis in order to insure that a sufficient number of variables is present to account for the interdependencies among variables and to test the predictive causal relations.

Teachers' Expectations

The domain of variables included under the category name Teacher's Expectations has received considerable attention in recent years, largely because of the work of Rosenthal (1968). Lockheed (1973) has prepared a review of the relevant literature in this domain. Lockheed concludes that the evidence for relations of teachers' expectancies and teachers' performance to student behavior or achievement is mixed. The reason for this conclusion is that not all of the results are consistent with each other. Clairborn (1969) was unable to replicate the results of the Rosenthal study. While studies using an experimental manipulation yielded inconsistent results, studies in naturalistic or field studies generally yielded consistent results (Brophy and Good, 1970; Jetter and Davis, 1973). Other reviewers (Baker and Christ, 1971; Hidde and Rosenshine, 1973) also point to the same inconsistency in results.

This area of research may be clearly distinguished from some of the other areas that we have been discussing. The methodology in this research and the focus of the problem is remarkably consistent. While the results are inconsistent, there is sufficient evidence that a relation may be found to make further exploration of this domain worthwhile. When significant results were obtained, they were in the direction predicted by the model used in this study. Lockheed (1973) has pointed out, however, that there may be some reason to believe that the students entering a class may act in such a way as to generate

an expectation in the teacher that subsequently causes the teacher to act differently towards one pupil than towards another. This qualification does not destroy the logic of the argument; it simply indicates that a finer grain analysis of the time sequence among such variables as student expectations, student behavior, teacher expectations and teacher performance may reveal an order in dependencies that is more complicated than the one predicted.

Organizational Variables

The evidence relevant to this domain of variables is meager, but extrapolation from other theoretical points of view lend some support to the notion that organizational variables will have a significant effect upon teachers' performances. Some of the evidence is at best indirect. It is practically a truism of social science that institutions set norms for authority relations. We would expect to find a certain parallelism between the kinds of authority relations existing within a school and the authority structure of the classroom. Also we expect normative rules to be schoolwide. We would expect the methods for engaging students in productive work which are regarded as appropriate will vary with differences in the authority structures of schools. Smith and Jeoffrey (1968) and Kounin (1970) have shown that certain kinds of school environments directly influence the teacher's ability to "control" a classroom, that is, to create an environment in which productive work is more likely to occur.

The prediction of a causal relation between organizational structure and perceptions is based on a wide variety of data. Correlations have been found between differences in perceptions of members of an organization and such organizational variables as complexity of the structure, types of communication channels, and types of decision-making processes. A rich experimental literature supports causal relations between variations in structure and a variety of performances in groups and group behavior (Cartwright and Zander, 1968). This literature as a whole provides sufficient reason to predict a causal relation between structural differences and both performances and perceptions.

The evidence that support for innovation affects organizational structure, and how this support affects the structure, is anecdotal. The logic of the argument is based on the concept of the variable.

Summary

In the preceding pages we have presented the rationale for the structural model which appears in Figure 2.6. The empirical evidence supporting predictions of causality in various parts of that model is in our judgment limited. Therefore, the argument for causal relations among variables rests primarily upon the concept of the nature of the variables themselves. A correlation will be found whenever events are in fact causally linked. The evidence presented above is sufficient to indicate where relations will be found. Its primary use is in identifying potential connections. But unless variables

have been systematically manipulated under controlled conditions, it is not possible to determine from a correlation whether or not two variables are causally linked. The paucity of experimental research and the impossibility of manipulating some of the variables involved in this study mean that we cannot rely heavily upon the research literature to support the plausibility of a causal relation between two variables.

This seeming limitation does not invalidate the claims for the causal relations in the model. The logic of the rationale is that we must first demonstrate that one of two variables occurs prior to the other. Second, we should have reasons based upon the nature of the phenomena involved to believe that one could act or should act as the cause of the other. Third, if correlations have been found between two variables, such data strengthen the possibility that they are causally related. Fourth, if one of the two variables has been manipulated experimentally, and the other changes as a consequence, the argument for causality is as strong as it can be.

Time Sequence of the Variables

The necessary condition for making a causal inference is that one variable must in real-time precede the other. The design of this study was built so that variables predicted to influence other variables causally were measured in time before the variables they were predicted to affect. Some variables are continuous states such as aptitudes. Some of these were measured after the events to which they are hypothesized to be causally connected; for example, some

teacher aptitudes were measured during the spring testing, but these were variables for which there was no reason to believe that they would have changed during the year. Other variables which we think are relatively unchanging, such as teacher expectations, have been measured twice to estimate if a change has occurred.

We provide in Table 3.1 a description of the method of measurement used to obtain information on each of the major variables in the structural model. Recall that in Figure 2.6 the two critical domains are teacher performance and student behavior. All other events are related in time around these two sets of events, some occurring in time before these observed performances, and others subsequent to them.

The first column indicates whether the event being measured is internal to the person or a behavior or performance that can be observed by another person. Then we indicate the nature of the measurement procedure. Several measurement procedures were used, among them a direct observation of performance (as in the case of the teacher performance variables), tests, and reports by the individuals themselves. In the last three columns we indicate when the measurements were made with respect to the observation of classroom performances.

It is the relationships described in these last three columns which present the case for the potential causal dependence among variables. Unless one variable exists prior in time to another

Table 3.1. The Time Sequence of the Measurement Procedures

VARIABLE	RESPONSE SYSTEM		MEASUREMENT PROCEDURE		DESCRIPTIVE REPORT	SEQUENCE IN TIME		
	Internal	External	Performance on Representative Sample of Tasks	Performance in Situation		Before Teaching	During Teaching	After Teaching
Learning	X		X					
Student Behavior		X		X		X	X	X
SE_{xp}	X				X	X		
$V_{er}A_{pt}$	X		X			X		
$C_{og}S_t$	X		X			X		
SA_t	X				X	X		X
TP		X		X			X	
TA_t	X				X	X		
TE_{xp}	X				X	X		X
TK_{te}	X		X			X		
TK_s	X		X			X		
TA_{pt}	X		X			X		X
$TP_{er}O_r$	X		X		X		X	X
O_rS_t		X	X		X		X	
$S_{up}I_n$		X	X				X	

SE_{xp} - Student's Expectations

$V_{er}A_{pt}$ - Verbal Aptitude

$C_{og}S_t$ - Cognitive Style

SA_t - Student Attitude

TP - Teacher's Performances

TA_t - Teacher's Attitudes

TE_{xp} - Teacher's Expectations

TK_{te} - Teacher's Knowledge of Teaching

TK_s - Teacher's Knowledge of Subject

TA_{pt} - Teacher's Aptitudes

$TP_{er}O_r$ - Teacher's Perceptions of Organization

O_rS_t - Organization Structure

$S_{up}I_n$ - Support for Innovation

variable, there is no possibility for a causal relation between the two variables. The reader, therefore, can judge for himself or herself the logic of the arguments about causal dependence by analyzing the information in the last three columns.

Conclusion

This study was designed to make inferences about causal relations among variables. We use the word "cause" to describe a variable if it occurs prior in time to another variable and if changes in this antecedent variable directly relate to changes in consequent.

Thus to make a causal inference the priority in time must first be shown. But this is not always easy to demonstrate particularly when variables are not manipulated. We have made the case for priority in time in terms of the nature of the variables themselves. The construct of a domain was defined and from this definition a logical analysis was made whose conclusion was that a particular domain preceded in real-time or psychological time its predicted consequent.

But another step is necessary if a causal inference is to be made which has probable validity. It must be shown that covariation between two variables cannot be attributed to their simultaneous covariation with other variables. The method of path analysis is a mathematical technique for calculating the partial correlations between variables in such a way that their covariation with other variables may be estimated. A significantly large path coefficient will be the basis for inferring that the covariation between two variables is not related to covariation with other variables.

But in order to make such inferences as valid as possible the structural model must include a sufficient number of variables so that the possibility of covariation with other variables is less likely. We presented the case that the domains of variables represented in the structural model is a representative sample of domains. We cannot claim that every potential variable in these domains has been sampled. But we have assumed that there is sufficient correlation among the variables in a domain that one or more of them may be used in the path analysis to estimate partial correlations which will tell us how that domain relates to other domains.

The model was constructed in terms of domains of variables. Each domain is a complex described by its dimensions. The measures used in this study sampled these dimensions.

Path equations were written to define the model in mathematical terms and the correlations among variables are coefficients in these equations. The solution of these equations produces the path coefficients. The magnitude and significance of these path coefficients tell us how well the structure fits the data. A "good" fit means that the model is a reasonable theory of the relations among the domains of variables. In Chapter 6 we present the formal mathematical model for the analysis used to test this structure. We remind the reader again that this particular model may not fit the data. We should also remember that other investigators may construct other models based upon a different rationale.

In the next chapter we discuss the concept and measurement of teaching performances. The concepts presented in the first four chapters guided the design of study, the construction of the structural model, and the development of the measurement system. The concept that required the most careful thought and precision in the development of its meaning is the concept of teaching performance because the major purpose of the study was to find the relations between teaching performance and student learning. The other measures used are described in Chapter 5. The scoring procedures are described in Chapter 6 in the context of the description of the data analysis methods.

BEGINNING TEACHER EVALUATION STUDY: PHASE II

FINAL REPORT: VOLUME I, CHAPTER 4

THE CONCEPTS AND MEASUREMENT OF TEACHING PERFORMANCE

INTRODUCTION

A teaching performance is one or more actions of a teacher whose purposes are to stimulate, facilitate, or enhance children's learning. This definition confines teaching performance to observable actions, even though the performance itself requires that nonobservable actions be undertaken; we assume that a teacher makes observations, evaluations and decisions that we cannot observe while he or she acts in ways that we can observe. An effective teaching performance is one in which the intended results are satisfactorily achieved. This definition stipulates that the effectiveness of a performance is evaluated by the achievement of its intended results; by implication, it may also be evaluated by its unintended consequences. These definitions are of limited usefulness if such words as "intended results" are not given specific and operational meanings.

Specifying a teaching performance as a set of actions is useful because it implies that learning may be facilitated <u>directly</u> by acts and <u>indirectly</u> by motives, feelings, concepts, or decisions when these unobservable events influence the character of a teaching performance. <u>Learning, when it is affected by the teacher, is affected by the teacher's actions.</u>

The most difficult problem to resolve is what to call an action. Is an action only a simple response, or can it involve more complex behavior; is it saying, "good," after a student has asked a particularly interesting question or given a satisfactory answer to a question? Is a performance the action of asking a question and

another performance the teacher's response to the student's response; or is the performance the combination of the question, the student's response, and the teacher's response to the student's answer?[1]

Categorizing Observed Instances of Teaching Actions

It is obvious that how one collects these instances of behavior into performances affects the likelihood of finding performances which are effective in the sense that the term is being used here. This problem is particularly acute when the intended effect of the performance is an increase of knowledge measured over time, such as improved reading comprehension. If we were looking for those performances which influence learning initial consonant sounds, our task would be relatively simple because we could ignore all of those teaching performances which were directed to other results. If, on the other hand, the goal is to find those teaching performances related to improved decoding skills, we must include a wide range of teaching performances because "decoding skills" is a comprehensive category that requires many different teaching actions.

A practical problem facing every observer of teaching is deciding what aspects of a complex situation to observe. An elementary school teacher is engaged in some type of action continuously for six hours every day. Jackson has estimated that an elementary school teacher may interact with students as frequently as a thousand times in the course of a day, and the total number of these interactions over a year

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[1] Dunkin and Biddle distinguish between phenomenal units such as the act of asking a question and analytic units such as the cycle of the teacher asking a question, the student responding, and the teacher evaluating the response (1974, pp. 75-78). Analytic units may be derived by finding consistent or repetitive sequences in observations of phenomenal units or by using categories derived from theories of learning or teaching.

is a staggering figure (Jackson, 1968, p. 11). Some combinations of these interactions are the performances which facilitate learning. The problem is to find which ones.

Distinction Between Teaching Acts and Performances

A distinction between acts and performances has been implied in the foregoing discussion. Acts are relatively simple behaviors, such as asking a question, praising, or listening to the child read. Each act is described in terms of a defining attribute which is readily observed; its description requires no more inference than that required in literal descriptive language. Performances are sequences of acts performed by teacher and pupil that are linked together as stimuli and responses. The child pronounces a word in a reading list, the teacher corrects the pronunciation; this pair of acts is a performance.

We will return later in this chapter to the problem of organizing acts (or behaviors) into performances. First, we will discuss how to count acts.

Duration and Frequency as Metrics of Teaching Acts

Assume for the moment that we could agree on the character of the teaching acts that we would observe. The measurement problem is to transform the observations into some type of scale. At the present time we usually cannot do more than produce a nominal scale. This nominal scale is produced by grouping the single acts into categories. We group acts on the basis of their common attributes. All statements

of the teacher which contain a positive evaluation of the child or his or her work may be classified into a category labeled, "Praise." Similar groupings of other acts yield a set of unordered categories. Sometimes a principle for ordering categories can be identified.

Ways of Counting Teaching Actions

We have two ways of summing acts by categories: we can count the frequency of the acts or events that occur in each category; or we can measure the duration of each act comprising the category, so that the total time for the category can be determined. For example, I am counting an event called, "evaluating," and I count the frequency of each instance of evaluative behavior, I will accumulate under that label relatively short but perhaps frequent events, such as uttering words like, "good." I will also count less frequent events enduring longer in time such as an extended statement in which the teacher indicates both what is desirable and undesirable in a student's performance. This more elaborate performance might require several statements and two or three minutes of time, although its frequency would be one. Each utterance of "that's right," also has a frequency of one. My summary sheet will not discriminate between these two events; the total score is merely the frequency of evaluative behaviors.[2]

[2]There are three different ways of counting frequency commonly used. One is to count the event each time it occurs; another is to count a frequency of one if an event occurs at least once during a prescribed time period; a third is to count each occurrence in a time-sample. The second and third systems reduce the counting to a common metric, occurrence per unit of time. In all three systems the sums by categories reveals the relative proportion of the categorical events in a period of observation.

Nominal and Psychological Meanings of Teaching Events

There may be a difference in the effect on learning of the two events because of the richness of the longer evaluative statement. On the other hand, the evaluative tone of both the simple word and the extended statement may be the critical component to which the child responds. The duration of the longer evaluative statement may have relatively little influence once the child sees that the teacher is approving. We do not know what the psychological consequences of either of these events is, even though we have classified both as evaluative behavior.

When we count frequencies, we are acting as if all evaluative acts have equal psychological effects irrespective of duration. We are assuming that each instance of the event is an equivalent psychological stimulus. We are also assuming that the repetitions have a cumulative effect; otherwise there would be no point in summing frequencies.

The first of these assumptions is difficult to accept. A longer utterance by a teacher is potentially richer in information or variety of stimuli, and therefore may be a more effective stimulus. Contrariwise, it could be argued that a rich stimulus invites a variety of responses from the student, some of which would be undesirable, incorrect or misleading in some way and therefore the longer event may have several different effects. But to assume equivalence between the one or two-word utterance and the longer extended statement, both of which are evaluative in character, requires that we act as if we had information that we

do not have, namely that both stimuli produce the same kinds of effects and therefore are psychologically equivalent. Since we do not need to make this assumption, why make it?

There are three solutions to this problem. One is to use more categories under the heading, "evaluative behavior." Another is to retain the single category but time each instance categorized in it. The third is to use more categories and time each instance that can be timed.

The first solution is the least useful for the reasons given previously. The second solution is impractical because brief evaluative comments are almost impossible to time. The third solution is the most practical because the longer events are distinguished by kind, frequency and duration. The briefer events are also noted by kind and frequency, and an estimate of the time allotted to them can be made if the time-sequence of the events is also recorded.

A system that records the duration of events which can be timed and which also notes the occurrence of brief but recurring events is likely to yield the best picture of classroom events. If the sequence of these events is also preserved in the record, the result is a continuous record of acts, differing in duration, whose relative frequency and order are also preserved.

Suppose that we time each act and use duration as the metric. Using duration, we assume that the length of the event is proportional to its psychological effect, at least to some unknown upper limit. We are not proposing that a longer explanation, for example, is

necessarily better than a shorter explanation; we are proposing that they are psychologically different because they place different cognitive demands upon the recipient of the explanation. Teachers' actions which are of longer duration require the learner to sustain attention for a longer period of time and to sort and interrelate more items of information.

If we also had some measure of the quality of the explanation we could relate duration to quality and use a duration-quality index as a metric. But we cannot make a priori judgments about the quality of an explanation or an evaluative comment. This quality can be estimated only by its effect on learning. The operational definition of quality in this study is that an act by the teacher is "better" to the degree that it produces better learning. At this stage of research it seems wiser to proceed by timing events and relating them as so measured to children's learning. After this analysis, a new category system may be constructed in which categories of events are indexed by their quality, that is, by the kind and amount of their effects. This revised system will yield duration-quality indices of teaching performances.

Advantages of Duration Metrics

In this study we are using measures of pupil effects which are comprehensive and the time span between the measurements of learning is very large. Under these circumstances it makes more sense to use a duration metric because it seems more likely that changes of this

scope and magnitude are likely to be affected by more complex performances rather than by simple behaviors. A more complex performance is better represented by its duration than by its frequency, simply because being more complex it will, in fact occupy more units of time.

Duration and representative sampling. Events in a classroom occur in a time-sequence and each event has duration. A sample of events should represent as accurately as possible the duration of events, the duration in proportion to the duration of other events, and the sequence of events. But if only a frequency count is made, the relative weights of the events represented by their duration is lost.

Assume that we have five categories of observation, and the observer checks a category each time an event in that category occurs. This method is the most common way of observing teacher behavior. If category one occurs ten times and category two occurs five times, we know only that category one occurred twice as frequently as category two. Since we know nothing about the duration of the events in each of the categories, we have no idea of the amount of time occupied by these events. The ratio of events observed in category one to total events observed may be misleading because longer events occurring less frequently are ordered below those events occurring more frequently.

We draw two different conclusions from each of the following statements: (1) the teacher made 25 evaluative comments; (2) the teacher spent 50 percent of the time making evaluative comments. The second statement indicates that a substantial proportion of the classroom activity was given to the evaluation of pupil performance. Even if we are using a category system that scans for a limited number of the events in the classroom, we can determine what percentage of time has been spent in the activities recorded.

It is also impossible when using frequency counts to estimate the ratio of the observed to the unobserved events. Since any human action has an upper limit on how frequently it can occur within a period of time, the relative influence of one category over a second in terms of time occupied is completely ignored in a system that depends upon frequency counts. But when we know the duration of events, we can calculate the proportion of the observed to the unobserved (or unrecorded) events.

Sensitivity of a duration measure to psychological effects. A case may be made for using duration measures in preference to frequency measures by drawing upon some concepts from learning theory. A general principle, which has different forms and names, is that a child must "practice" the responses that he or she is attempting to acquire.[3]

[3]The words "practice" and "correctness" are placed in quotes in these sentences to indicate that they are being used in a general sense. Practice means that the child is engaging in the behavior or responses which he is attempting to acquire. Practice, in this context, may include thinking about a reading passage or reading out loud to the teacher or performing a computation. "Correctness" means that there is some standard that may be applied to the actions of the child such as an accepted interpretation of a reading passage, an acceptable sound for a letter or a word, a correct answer for a sum. The two terms applied to the development of attitudes would be inappropriate except in the loosest sense of the words.

This "practice" serves many purposes such as: providing an opportunity for receiving feedback on the "correctness" of the response, integrating responses, associating ideas, testing examples of a concept, developing a facility in a performance, and eliminating errors in a performance. We expect children to learn to read by reading, to learn to write by writing, to learn to think by thinking. Practice in this sense is a necessary but not a sufficient condition to acquire skill, or knowledge or understanding. But the more time spent under appropriate conditions thinking, or reading, or writing, or computing, the more likely it is that the child will learn what is to be learned by engaging in these activities.

Some readers will rightly object that mere time-spent is not likely to predict differences in how much children learn. But a different point is being made here. Time in class is necessarily allotted to different instructional activities. Their relative durations is a way of distinguishing them. The regression analyses which relate teaching performances to scores on measures of pupil learning will tell us which activities are more likely to be effective and whether a longer or shorter duration has more positive effects.[4]

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[4]The results of previous research on instructional time are equivocal. If instructional time is defined as time-spent in a specific learning activity, the results are inconsistent (Rosenshine, 1970, pp. 186-192). If it is defined as "student opportunity to learn," the results are "positive, significant, and consistent" (Rosenshine, 1971 p. 196). But in these studies the variable(s) was measured by asking the teachers to report the amount of time or to rate the opportunity. We are proposing here that the actual amount of time as observed be the measure.

In the preceding pages we have been presenting the case for using duration of a teaching event as a more useful metric than the frequency of the event. Of course, until analyses of teaching performances using this metric have been made, the issue is moot. The case for using duration has been made at length here because the measures of pupil learning are complex, and, it is most unlikely that sheer frequency of single events are likely to be correlated highly with improved children's learning as defined in this study. Perhaps the inconsistency of results in previous research occurred because of the heavy reliance on the frequency metric.

The Phenomena to be Observed

A very large number of events occurs in a classroom over the course of a day. Not only are there many events but they are also diverse in kind. The acts or events include the actions both of the teacher and of all the students in the class. In many classes aides are present and their actions are part of the instructional system that develops in each class. Further, not all of the activities are instructional in nature. Some activities are preparatory to instruction, some are what are usually called management activities. Some are designed to preserve order to insure compliance with the social rules that govern behavior in the classroom.

The pattern of organization in the classroom changes periodically. At one time the child is working independently, at other times he is working in a small group, and on still other occasions all the children

are assembled into a group comprised of the entire class. The teacher will interact with an individual, with a group, or with the class-as-a-whole. Sometimes the teacher is working at the board, at other times she is sitting at her desk while pupils work in groups or independently. As the students are engaged in an activity such as silent reading or working on mathmatics problems, the teacher will circulate among them. Occasionally the teacher conducts a discussion, at other times the teacher conducts a question and answer period. Some time is spent organizing the work activity and answering routine questions. The materials of instruction vary. The child may be reading in a book, working with paper and pencil at his desk, working at the blackboard or in a workbook. The teacher can also make visual presentations using slides and overheads.

The substance of what is being taught varies. Periodically new concepts and new facts are introduced. Other periods are set aside for practicing skills, for review of concepts and facts, or for repracticing or reviewing a skill.

Since it is humanly impossible to record all the events in the classroom without introducing so many observers that the environment changes significantly, some selection of what is to be observed, who to observe, and when to observe must be made. Even as we list the variety of events occurring in the classroom, we are organizing them into categories and consequently selecting from among all the events those which are included in these categories. Each observational system that has been developed for the observation of teaching

performances has been built by making decisions to record certain kinds of events. What is equally obvious, but not always recognized, is that by selecting a set of categories which will comprise the events that an observer records, the developer or user of that system has described the meaning of teaching performances and by implication has indicated what he or she believes to be the critical teaching performances. There are two approaches to developing such a system, and we discuss each briefly here as a basis for explaining the choice of the systems that we have selected.

The Theoretical Approach to the Development of an Observation System

One approach is to begin with a concept of effective teaching practice or a theory of teaching or instruction. Ideally, such a theory should specify the actions to be taken if certain desired changes in children were to occur. The theory should specify the constructs which are to organize the observed events of the phenomenal world of the classroom. Also, the theory should specify the measurement operations by which data to test the theory are to be gathered.

Joyce's recent book lays out the theories of teaching that have been developed to date (Joyce, 1972). Most of these theories are importations from psychology, particularly learning theory and clinical psychology, and from sociology. They have been used more or less unevenly in the study of teaching. Most of the studies of teaching, studies where data have been gathered to test hypotheses or theoretical constructs, have used constructs derived from different theories of

learning. These statements are not an implied criticism, because it is customary for an applied science to use a variety of theoretical constructs and models which have been developed in basic sciences. But given an array of theories from which to select, what determines a choice?

Investigators have personal preferences, but for a study of this kind a more objective reason would be required. There are two ways to be objective; one is by supporting the plausibility of the analogy between the theory and teaching; the other is by adducing empirical tests of theory applied to teaching; in other words, showing that when theory is applied to teaching, useful results are obtained.

Constraints on models of teaching events derived by analogy. Consider the plausibility of analogies. Theories generally develop by empirical analyses of observed data. The constructs in the theory are modified in the light of what the data reveals about the meaning or the utility of the construct. Theories of social interaction have developed in part out of observations of small groups of individuals meeting to discuss a topic. Such theories have been developed largely by the study of adults. If a theory derived from the analysis of social interaction in small groups of adult members is used as the basis for thinking about the phenomena of teaching, two problems are apparent as one attempts to make the translation of the theory into the new setting, in this case the analysis of teaching. First, the extrapolation of constructs and hypotheses derived in the original

setting to the new setting must take into account the differences in the characteristics of the individuals observed in the original settings and those to be observed.

The second problem is that the structure of events in the environment in which the original set of data were collected and from which the theory was derived may be markedly different from the context to which the theory is to be applied. Again using the example of small group interaction, some theory in this area has been developed by the analysis of leaderless groups. If one were to apply the theory derived from that type of experimental situation to a classroom, where the teacher's role by law makes her responsible for the students and where she exercises some degree of authority, one runs the risk of using constructs for which no empirical referents will be found.

Even formal learning theories, which on the surface seem most likely to be applicable because they are derived from the study of learning phenomena, have well known weaknesses when extrapolated to learning in classrooms. The theories were constructed to explain a limited set of learning events in particular kinds of situations and under particular conditions. The extrapolation of the notion of reinforcement, for example, to classroom situations requires numerous assumptions. One must assume that verbal utterances which are regarded as positive in some classes of American society are so regarded by children. It is also difficult to find in the classroom precise analogues to the conditions created in learning studies

conducted in the laboratory, the most obvious difference being that the teacher is interacting with a group, whereas most learning studies are conducted on individuals.

Conditions for using a theory to build an observational system. If one is going to use a theory as a basis for developing an observation system, this choice must be based upon two factual considerations. First, the constructs of the theory must have links to events known to occur in the classroom, and second, the major hypotheses in the theory must have plausibility for explaining the dynamics of classroom interactions or the changes in students that are expected as the consequence of instruction.

There is some likelihood that events that occurred regularly in the environment from which the theory was built may not occur or occur very infrequently in the setting to which the theory is being applied. One does not ordinarily find the same kind of expression of affect, for example, among school children that one finds in groups undergoing therapy. The absence of these phenomena in a classroom setting tells us that the theory being extrapolated may not be capable of explaining the phenomena occurring in the classroom.

A third consideration is important in selecting a theory to analyze the events of classroom situations. The activities of the classroom are work-oriented and goal-directed. The goals are diverse and many; the range of work-oriented tasks are numerous. Most psychological theories have been developed in contexts that are not as complex as that of the

classroom in terms of the variety of tasks and goals that they include. Extrapolation of theories about simpler events to a more complex set of events stretches the theory considerably, and it is not surprising if the theory does not adequately account for the diversity and complexity of classroom events and their consequences.

These reservations about the use of theory in the analysis of classroom phenomena is not an argument against using such theoretical approaches. The investigator, however, is faced with a practical choice. The investigator choosing to use a particular theory runs the risk of not finding analogues in the classroom relevant to the explanatory constructs in the theory. To the degree that such discrepancies occur, the usefulness of the theory for accounting for the phenomena of instruction is reduced.

Another approach to the problem of classroom observation is available, and it was the approach recommended to the California Commission for Teacher Preparation and Licensing. They accepted this recommendation, and the procedures of this second approach are those that were used in this study.

Inductive Analysis of Teaching Performances

An alternative approach to gathering data on classroom phenomena is to start with concrete observations of what actually occurs in the classroom and then group these descriptions into categories. The procedure involved in this method is to record as precisely as possible the events of the classroom as they occur; for example, a statement by

a teacher is recorded exactly as made. Consider as a second example the pattern of movements of the teacher in the classroom. Occasionally he or she is standing in front of the class giving an explanation; other times the teacher is sitting at a desk while the pupils work at their places; on other occasions the teacher is working with a small group. In each of these instances the observer records literally what the teacher is doing and what the children are doing. The observer records statements made by the teacher, statements made by the children, and other actions of both the teacher and the students.

The result is a detailed record of specific actions of both teachers and students over a period of time. The resulting record is a very large list of specific items which are as descriptive as possible, and from which inferences about the meaning of the behavior has been eliminated as much as possible. If the teacher is addressing the class, for example, the observer records as precisely as possible what it is that the teacher says. Obviously, the observer may not be able to record every word and may do some low-order categorizing, such as "teacher states the purpose of the lesson;" or "the teacher works a problem on the board" (notations are made about the nature of the problem).

As the observer writes descriptions of actions, he or she uses categories, because words are labels for concepts, which are categories. But the descriptions can be recorded so that the observer does not make an inference in the process of writing a description. An inference has been made, for example, if the observer records that "the teacher

rewarded Johnny for his answer." A descriptive statement for the same event is, "the teacher said 'good' after Johnny answered the question."

The inductive method of describing teaching performances must start with descriptions from which inferences have been removed as far as possible.[5] These descriptions are organized into categories, which are the descriptors of teaching performances.

Classifying behavioral recordings. These descriptions must subsequently be classified. The process of classification involves scanning the items for similarities and using these similarities to construct categories into which the items will be sorted. Rules of classification are developed for this sorting process which coders follow in sorting the items. These categories are, of course, higher-order constructs. The system must meet the following requirement: that the items coded into it have common characteristics, that the categories are independent, and that the rules of classification are sufficiently clear so that two coders classifying the same items will substantially agree on their classifications.

The advantage of this procedure is that the events categorized are those which have actually occurred. It is these events which are the basis for explaining the effects of instruction. If one is attempting

[5] Some events cannot be described literally as when a teacher gives a ten-minute explanation. In such cases the observer records that an explanation has been given and notes its major points: purpose, topic, key points. Transcriptions of such events can, of course, be made. In this study the cost of making transcriptions was prohibitive.

to account for gains in reading comprehension, the only phenomena that can account for those gains attributable to the teachers and students are the events which have been observed to have occurred.[6]

Meanings of "omissions" in behavioral recordings. It is plausible, however, that amount of gain might be explained by the omission of events, or by a combination of the presence of certain events and the absence of others. Unless the observer is present every day of the school year, omission has two meanings. When the observer is present for the entire year, omission means an event never occurred. If, however, the observer is present on a relatively small number of days (in proportion to the days in the school year), omission means that a particular action or set of actions was not observed on those occasions when the observer was present. Since observers are usually present infrequently (relatively), it follows that absence of an event or a set of events may be looked at in two ways: (1) that the absence of the event may be typical of the teacher's pattern of actions; (2) that in the structure of events observed, an omission or absence (or zero-score) is an estimate of the teacher's typical pattern within the pattern of events which were observed; or, that the proportion of events present and events absent is the typical pattern of the teacher.

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[6] We are not claiming that these are the only events which account for differences in learning. Refer back to Figure 2.6; that figure portrays the domains of variables that may account for learning. Here the point is that in the categories, Teacher Performance and Student Behavior, only the descriptions of actions recorded on the occasions of observation are used in the analysis to account for the variations in children's learning independently of other factors influencing learning. Other events that were unobserved, because observers were not present when they occurred, may have been mediators of learning.

Assuming that omission of events, as described in the second assumption above, is a reasonable way of looking at classroom events, it follows that both presence and absence of events are potentially useful ways of describing classroom events. We may then look at classroom events as a mixture of events occurring and events not occurring. The questions to be answered are: which among the events observed are related to improved children's learning, and is the absence of certain events related to children's learning?

Values of behavioral recordings. The advantage of observing and recording discrete events is that a better picture of what is occurring emerges. Categorical observations on the other hand, particularly those derived from a particular theory, tell us only if the events subsumed in the original categories occurred. If, also, one combines literal description with a measure of the time of the action or event recorded, the resulting description of the classroom portrays both what occurred and did not occur and the duration of the actions or events recorded.

The practical problem with this procedure is that it also faces the reality that a multiplicity of events occur in the classroom which no human observer could possibly record. There is no way to eliminate this problem without seriously interfering with the ordinary course of events in a classroom, a consequence undesirable in the type of study that has been conducted. A method of sampling events was used in this study to obtain a representative sample of classroom events. This method will be explained later in this chapter.

Comparison of APPLE and RAMOS. Two systems of observation were used in this study. One system (APPLE) requires the observer to make literal descriptive reports of the events of the classroom. These recordings are subsequently classified into categories. This system had been used extensively in elementary school previously, and, consequently, considerable experience had been acquired in classifying events such as those that were recorded in this study. These categories were used as an initial frame for sorting the items, and were subsequently modified on the basis of the observations made in this study.

The other system (RAMOS) is a categorical system; however, its categories were developed after intensive observation of elementary school teachers engaged in the teaching of reading and mathematics. The categories therefore were categories derived from analysis of observations made by the method described above. The difference between the two systems is that during the period of observation APPLE observers recorded items which were then subsequently coded independently by a group of coders experienced in classifying such items; whereas, RAMOS observers coded categories which had been derived from previous observations of similar classroom phenomena.[7]

[7]The reasons for using two systems were scientific and practical; by using the behavioral recording system (APPLE), a representative record of each classroom was obtained on each occasion of observation; by using the categorical system (RAMOS), we were able to check its validity and to determine how much was lost by using a categorical system on site which had been built from behavioral recordings like those used in the first system. The practical goal is to build a useful system. A useful system is likely to be a categorical system because a behavioral recording system, while very useful for research, is difficult and expensive to use for practical goals such as helping teachers improve their teaching.

The details on the development and use of these two systems are reported in Volume III of this report; the principles and concepts underlying them and their use are also described in this chapter.

It will be useful at this point to contrast the two approaches to describing teaching performance, recalling that in one instance the events of the classroom are observed in terms of a prescribed number of categories; in the other the number of categories is derived by classifying concrete observations made in the classroom. Both systems yield a set of descriptions of classroom events. But the second approach yields descriptions of all of the events that have occurred in the classroom, whereas the first approach classifies only those events which occur relevant to the categories of observation.

Strictly speaking, both methods can record only those events that the well-trained observer can manage to record under the usual conditions of observation. The category system has some advantages in this respect, if the number of categories is not too large, because the observer has merely to check or make some kind of a mark to indicate that an event in a particular category has occurred. The observer making behavioral recordings has a more difficult task, but this system provides a large set of descriptions which may be classified and reclassified until useful categories are constructed.

Both types of systems face a problem of obtaining a representative sample of classroom events; however, a category system suffers more in this respect than a behavioral recording system. No one knows what a

representative sample of classroom behavior is because there are not data available which have been gathered over many days and many classes and many teachers from which the population of events may be described. A category system built upon a theoretical conception or a particular set of constructs requires that the observer attend only to events relevant to the categories. There is no way of knowing in advance what proportion of the total events that occur in a classroom are likely to be events in the category system being used.[8] The behavioral recording system (within the limitations imposed by recording numerous events) seems more likely to obtain a representative sample of events that are occurring on that particular occasion. All systems must cope with the fact that their users do not know whether the sample of behavior obtained on the day of observation is a representative sample of the teacher's or children's classroom behavior.

In a study which is designed to search for the teaching performances related to specific student outcomes, it seems that a greater risk is run, if one precludes certain categories of events in advance by the type of observation system chosen for the observations. In this study, therefore, we decided to use a behavior recording system (APPLE). But we also used a category system (RAMOS) but one that had been developed from a behavior recording system.

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[8] RAMOS is less liable to defects in this respect because its categories were derived from intensive observations in which literal descriptions were made. There are two differences between RAMOS and APPLE. The method of recording events on site differs. RAMOS is more oriented to the content of instruction.

Specifying the Unit of a Teaching Performance

Earlier in this discussion we pointed out that the events that occur in a classroom can be observed at a variety of levels of aggregation, each successive level subsuming categories or units below it. Unfortunately there are no basic units of action or behavior which are universally agreed upon which could form the substratum of an analysis of complex performances such as teaching.

One suspects that the variety of category names for teaching performances may not be as discrete as their names suggest. But unless one was able to point to specific instances of action or behavior that were subsumed into two categories with different labels, there is no way to know whether or not two category names subsume the same or different actions. Nor is it possible to determine whether two categories that sound as if they represent the same level of aggregation of subunits in fact are organized at the same level of abstraction.

There is a profusion of names for teaching actions and for aggregations of them. Each investigator tries to specify what he or she means by a particular label by describing as best as he or she can which actions are grouped under the label. Words are used for this purpose, and they convey only a schemata of the events.

The problem of describing the events behaviorally can be resolved by using standard portrayals of these events; for example, videotapes may be made of the events; these tapes then become the operational description of the teaching actions subsumed under a particular label.[9]

[9] In this study videotapes were made of the classrooms that were observed live. A discussion of the methods of recording, coding from the tapes, and analyzing the data is presented in Volume III, Chapter 3.

This procedure, however, will not resolve the basic problem, namely, what are the units of action which are to be combined into sequences called teaching performances? The practical consequence of the lack of the unit of action is that each description of a teaching performance represents an aggregation peculiar to a particular investigator.

A more fundamental difficulty exists in the description of teaching performances. If one thinks of a performance as a set of actions in sequence (a useful way of thinking about performances which distinguishes them from single responses or simple behaviors), then the description of a performance ought to indicate the actions and their eliciting stimuli.

There are no simple rules for aggregating units of action in this way (if we knew what were useful units). There are, however, two ways of arriving at such aggregations. The most common method is to look for similar attributes in actions and group by these similarities. A second way is to group by similarity of attributes and then relate the categories so constructed to a criterion, for example, children's learning. By continually regrouping actions and relating each such modification to a criterion related to children's learning, one expects eventually to find clusters of actions which relate significantly to children's learning.

Phenomenal and Analytic Units

A unit in phenomenal language is an ordinary descriptive English statement about an observed event. An analytic unit is a higher-order categorization of these phenomenal events. Given our present understanding of classroom events, it is probably better to begin with

phenomenal descriptions of the events. Such descriptions can then be organized into larger aggregates that group such actions and into still more abstract organizations of these groups.

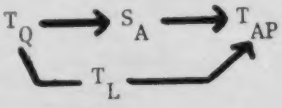
Thus the unit of action is any action about which an observer can write an English sentence or phrase that uses only descriptive language, such as, "the teacher said 'good' when the pupil answered the question"; "Johnny raised his hand"; "Susie read the passage" (with a notation about the passage).

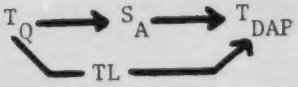
When a large number of such events have been recorded, they may be sorted into groups in terms of common attributes. These groups are classes of actions; for example, all teacher's statements that describe the teacher uttering words of commendation may be grouped into a category called "praise." Such groupings destroy the sequence of events but preserve their duration.

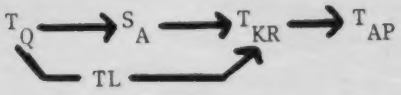
Another type of analysis is possible. Events at the phenomenal level may be grouped into chained sequences of actions to be called performances. Consider, for example, a teacher in a question and answer exchange with students. A fairly typical pattern is for the teacher to ask a question, call on a child who is volunteering to answer, listen to the answer, and then indicate either that the answer was correct or not, and if correct, to make a verbal statement that communicates the teacher's approval. This event occurs relatively quickly, and then the teacher may move on to another.

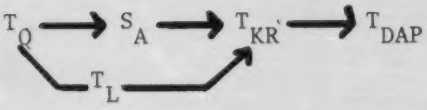
In this sequence of events there are essentially three kinds of teacher behaviors, question-asking, listening, and giving feedback accompanied or not by approval or disapproval statements. Two chains can be found in this sequence: question, listen, approve; question,

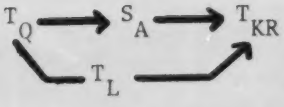
listen, disapprove. If knowledge of results is inserted before approval then there are five more possibilities. These possibilities are represented as follows:

(1) 

(2) 

(3) 

(4) 

(5) 

where

T_Q = teacher questions

T_L = teacher listens

T_{KR} = teacher provided knowledge of results (corrective feedback)

T_{AP} = teacher approves

T_{DAP} = teacher disapproves

S_A = student answers

The differences in these chains is whether or not feedback is provided and is linked to approval or disapproval.

The investigator can sort through actions looking for such patterns, but simple analytic techniques are available to perform this task reliably.

First, after inspecting the observational protocols to get a feel for the sequence of events, the investigator can construct contingency tables which list all the classes of actions along the columns line and the row line as follows:

CLASS OF ACTION

A B - - - - - - - - - Z

CLASS OF ACTION

A
B
|
|
|
|
|
|
|
|
Z

The frequencies in this table can be used to estimate the correlations among the classes. Using what he or she knows from studying the protocols and the correlations, the investigator can generate a list of sequences by selecting those that are significantly correlated and are known to occur in sequence. (Note that the investigator can imporve his or her precision by counting the occurrence of events in sequence - a laborious task even with the aid of a computer.)

Factor analytic techniques can also be used to sort actions into larger groups, but to use these procedures at the beginning of an analysis of performances is risky because the factors are more likely to represent only the consistencies in behavioral patterns rather

than their sequences. A better strategy might be to first cluster actions into performances, and then factor the clusters into factors representing behavioral patterns.

The Empirical Description of a Teaching Performance

Teaching performances, if the methods discussed above are used, are descriptions of interdependencies among events as they actually occurred. They are not a priori classifications of actions. The difference in these two ways of defining performances may be illustrated by an analogy. When a zoologist wishes to classify birds, he or she can observe birds and subsequently group the observations, and then develop a taxonomic system for classifying the birds from these groups. Or the zoologist can begin with a set of descriptors and see if he or she can classify birds by using them. The second approach works well when considerable information is already available on the characteristics of birds. Given the state of the art in research on teaching, we thought it wiser to use the first approach.

Another problem related to organizing a sequence of performance is whether or not to include pupil events in the chain of teacher events. It seems obvious that large numbers of teacher events are linked in some way to pupil events and vice versa. Approval or disapproval is not given at random but is usually linked either to the satisfactory quality of the student's response or to the attempt by the student to provide a satisfactory response.

We have organized the data in this study so that teacher events and pupil events can be linked together. It is our belief that a useful way of conceptualizing performances is to construct teacher event-pupil event dyads and sequences of these dyads as the basic units of teaching performances. It is possible to distinguish whether the pupil event is the initiating event or the teacher event is the initiating event, thus providing two general kinds of sequences.

But it should not be overlooked that there is a large number of teacher events which are not linked to the actions of one pupil as for example, when a teacher stands at a blackboard and explains a problem, or when the teacher introduces a lesson by stating its purpose and describing the major activities that are to follow, or when the teacher gives instructions to the class-as-a-whole. The reader will see that our categories include both kinds of events, pupil-events linked to teacher actions and teacher actions which are linked to the actions of groups of pupils.

The problem of organizing the discrete events of classrooms into performances of teachers or students is complex, and one for which there are no easy solutions. What we have attempted to do in this study is to introduce features that should make it possible to look at performances as sequences of actions. We have recorded actions as they occurred in sequence, and we have recorded pupil events as they occur in relation to teacher events so that it is possible to construct chains of teacher events and pupil events.

The Measurement of Classroom Performance

There are three problems to be solved in designing a system of measurement that will provide valid and reliable information on both teacher's and student's behavior and performance in classrooms. The first of these problems is to design a system that will describe as adequately as possible the full range of teacher performances and student behavior. The second problem is to devise a metric which orders the observational data. The third problem is to secure a reliable sample of teacher and student behavior. The second of these problems was discussed earlier in this chapter and will be reviewed briefly to illustrate the relation between the type of metric used and the adequacy and meaningfulness of the samples of performance and behavior obtained by the method of observation.

Obtaining a Comprehensive Sample of Classroom Performances

The methods of observation used in previous research have largely focused on the behavior of the teacher. These systems collect specific information about what the teacher does, usually in terms of the frequencies of the categories of behavior which is observed. We suspect that one of the reasons that these systems have to date provided a small number of significant relations between teacher performance and student learning is that they have not included descriptions of student behavior or have not linked teacher performance and student behavior in interaction sequences.[10]

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[10] An exception is the work of J. Brophy and T. Good; see Teacher-Student Relationships: Causes and Consequences (New York: Holt, Rinehart and Winston) 1973.

Classroom events may be sorted roughly into three major kinds: those in which the teacher is the primary actor and in which the student's role is primarily that of the listener; events in which the teacher is relatively inactive and the students are engaged in work activities; and the third type of events are those in which the teacher and students interact. An example of the first type of event is when the teacher lectures or explains. An example of the second type is independent seat-work in which the students have an assigned task on which they are working. An example of the third type is the teacher asking questions and the students answering them.

An observation system that focuses only on teacher behavior is most useful for the first type of event, but is less useful for the second type of event because it ignores the characteristics of the student activity which may be critically related to student learning. The problem created by observing only teacher behavior in interaction sequences is that the consequences of the teacher behavior are omitted and the effects of student behavior on teacher performance are also omitted.

It is generally agreed that the critical events affecting student learning are the actions in which the students themselves engage. These actions are the necessary and sufficient conditions for learning. The teacher's actions are the necessary conditions for eliciting the appropriate student action. Therefore, if one wishes to study the influence of teaching on learning, one must look at the influence of teachers' actions on student behavior and student behavior in turn on learning.

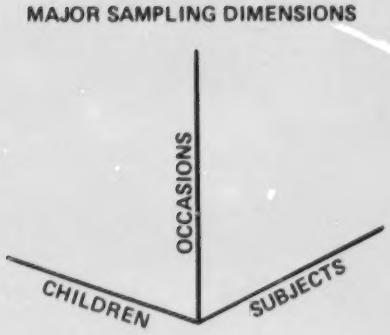
It can also be argued that a "true" picture of the teacher's performance will not be obtained unless one also obtains information on the stimuli which are eliciting the teacher's performances. If a teacher is explaining without questioning and without accepting questions from students, it is a reasonable assumption that the teaching performances are controlled by some conceptual plan that the teacher is following. But if the teacher is interacting with students by asking them questions or by answering their questions or by stimulating them to discuss a problem, the teacher's performances are likely to be influenced by the kinds of reactions of the students to the teacher's questions and to each others' comments. These two points seem to be strong arguments for observing both teacher performance and student behavior if a comprehensive sample of classroom events is to be obtained.

There are real difficulties in obtaining an accurate picture of a sequence of interaction between the teacher and students. If the observer is using a behavioral recording system, it is difficult to record everything that the teacher says and everything that the student says or does. If a category system is used, the observer must check very rapidly in the appropriate categories and appropriate categories must be available to check. These difficulties can be minimized by sampling events, and two such observation systems were devised for this study. Later in this section a fuller description will be provided of these systems. Their purpose was to preserve as much information as possible about both the teacher and students.

Sampling the Range of Classroom Events

There are two kinds of sampling problems to be resolved in gathering an adequate sample of classroom events because there are two sources of variation in classroom events. One source is the variation that results from different events occurring on different days. The other source of variation results from different kinds of events occurring on any one day. Differences across days result from differences in what is being taught on different days, the children's rate of progress, and local activities such as field trips, fire drills, parties for holidays and similar events. The differences on any given day occur as a function of what is being taught to whom. Thus one expects to find differences depending upon whether reading or mathematics is being taught. One also expects to find differences related either to the individuals or the group with which the teacher is interacting. These sources of variation may be represented as in Figure 4.1. In this figure Occasions represents different days of observation, Subjects refers to what is being taught and Children refers to whom is being taught.

These sources of variation may be further subdivided; for example Subjects may be further refined in terms of the specific goals of instruction of characteristics of the learning activity (Figure 4.1c). Reading may be subdivided by whether the teacher is working with the children on the acquisition of decoding skills or the development of reading comprehension. The dimension of Children may be subdivided in terms of the characteristics of the children themselves. The children may be sorted in terms of teachers' expectations about their performance,

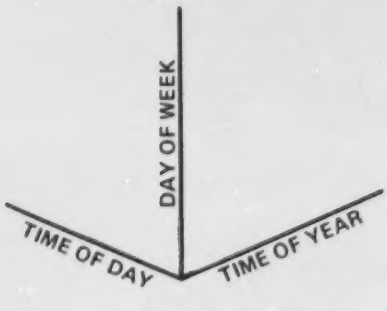


CHILD, OCCASION AND SUBJECT DIMENSIONS

Figure 4.1a

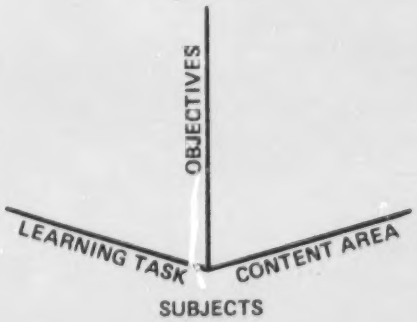
CHILDREN

Figure 4.1b



OCCASIONS

Figure 4.1c



SUBJECTS

Figure 4.1. Sampling Dimensions of Classroom Events

or previous achievement, or aptitude characteristics (Figure 4.1a). Occasions may be divided into three kinds: by time of year, by day of the week, and by period of the day (Figure 4.1b). The goal of the system of observation should be to sample as many of these dimensions as possible.

The practical difficulties of achieving this goal may be illustrated by considering the possibilities for sampling available along one dimension, Occasions. Figure 4.2a illustrates the possibilities if occasions are broken down by time of year, day of the week and period of the day. As can be seen, this sampling matrix provides at least 800 occasions are may be sampled. One could, for example, sample every third month, the first and fourth week of each month, and the first day of each week, and the first period of each day. Such a sampling system would yield ten occasions of observation -- two each month for five months of the nine months of school from September to May (Figure 4.2b). Obviously a sampling plan of this kind assumes that events on the first day are not different from those on any other day of the week; that those in the first and fourth weeks of the month do not differ from those in the second and third, and that each third month yields a representative sample of what is occurring across all months.

This example of a sampling plan was selected to illustrate the sampling problem. This particular method has obvious weaknesses. Few would assume that the events occurring in the first period of the day are representative of those that occur through the rest of the day. Similarly selecting the first day of the week would not be wise because we generally expect the

Figure 4.2a: Major Sampling Dimensions of Classroom Observations by Potential Occasions

TIME OF YEAR

September ----------May

Week	1				2				3				4				1				2				3				4			
Day	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
PERIOD																																			
1																																			
2																																			
3																																			
4																																			
5																																			

8 months x 4 weeks/month x 5 days/week x 5 periods/day = 800 occasions

- - - - - - - - - - - - - - - - - - - -

Figure 4.2b: An Illustrative Subsample of Occasions

TIME OF YEAR

September, November, January, March, May

Week	1				2				3				4				1				2				3				4			
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
PERIOD																																			
1	x					x															x					x									
2																																			
3																																			
4																																			
5																																			

x's indicate week, day and period sampled in each third month. This system yields 10 occasions of observation.

first day to be somewhat different from other days. Whether the first and fourth weeks or every third month would produce a representative sample is not known. A possible solution to the problem of obtaining a representative sample is to sample randomly across all of these occasions.

Unfortunately, such a plan is economically and logistically impractical because it would require observers to appear in classrooms on different days of the week at different times of the day in different weeks and months. Such a system is impractical because with classrooms spread out over a large geographical area, it would be impossible to arrange an observation schedule that did not confound some other aspects of the observational system or of the implementation of that system. For example, it probably would be impossible to hire a group of observers who would have the freedom to be assigned randomly to all of the different occasions of observation. A certain number of periods of observation would inevitably be wasted because the observer would show up in the middle of a fire drill or on the day of a field trip or on the day of a party, and even though observation of the teacher on such occasions might tell us something about the teacher, we would not obtain information on teaching performances likely to be related to student learning. Others will argue that observing the teacher on occasions such as fire drill or during a party tells us something about how the teacher interacts with the child. But such information on the teacher should also be apparent in his or her interactions with the children during instructional activities.

We made the assumption that the occasions on which the teacher was engaged primarily in instructional activities were the occasions of greatest interest in this study. If teaching performances do not relate to student learning when they are observed on these occasions, it is difficult to see how events which presumably are somewhat more remote from learning are likely to have a powerful influence on what children learn. Put in terms of an example, we expect to learn more about the effects of teaching performances when observing the teacher teaching reading then we do by observing the teacher during the Halloween party.

We frankly admit that the sampling of occasions was in part determined by the resources available for observing. We had resources for 400 days of observation. We made the following decisions to simplify the sampling plan:

1. Observations would occur from February through May. This decision was necessary for practical reasons but it also makes empirical sense. The initial testing ran through October and November, so that observations prior to the initial testing did not fit the research model (though information of this kind would have been useful to establish a baseline of teacher performance).[11] There

[11]The original design called for far fewer days than 400. During the months of September through December, the California Commission for Teacher Preparation and Licensing was negotiating with the National Institute of Education for an increase in the number of days of observation. Since the National Institute of Education was interested in providing more days of observation, and since this decision became final only in December, we of necessity had to postpone observations until after the conclusion of a new agreement. Further, the system of approval necessitated detailed discussion with the Evaluation of Teaching Committee of the California Commission on the specific observation systems to be used. We began these discussions in the middle of November and satisfactory systems were approved at the January meeting of the Commission.

may be a real advantage to observing in the latter half of the year. We can assume that both the teacher's performance and the children's classroom performances will have stabilized by the second half of the year.

Practically speaking, the first four months of school have about five to six weeks useful for observation. The first few weeks of school are used to organize instruction, and there is considerable shifting of pupils in groups. The month of October through the first part of November is a relatively useful period, though at least one holiday and several celebratory occasions occur in this period. From the middle of November to the end of November is the period influenced strongly by the oncoming Thanksgiving holidays. The latter half of December and the first part of January are similarly influenced. Instruction obviously occurs during these periods but it is attuned to the pace of other kinds of events.

2. Since the observation of a classroom required the full cooperation of the teachers, we asked the teachers what days of the week they thought would be best for observing in their classrooms. They recommended to us that we observe on the three middle days of the week (the reasons seem to be obvious).
3. We secured information on holidays, days for field trips, and days on which other events would modify the typical daily schedule. None of these occasions were used for observation for the reasons previously cited.

Thus in terms of months, observation occurred in a four-month period from February through the middle of May; in terms of days of the week, observations occurred on the three middle days of the week. Within these constraints observers of necessity were scheduled on different days for different teachers because these were days available for observation as indicated by either the principal of the school or the teacher.

We did not take a random sample of days available for observation because of the practical problems of scheduling observers into approximately 100 classrooms in 45 schools spread throughout the State of California. In this respect this study does not differ from those of other investigators.

The purpose of this study should be recalled. It is not the purpose of this study to describe how teachers behave across all occasions and events. The purpose is to find out which teaching performances are associated with greater gains in student learning. Thus the observational data do not describe how teachers behave across every kind of occasion. They do describe how teachers behave on those occasions entirely devoted to the teaching of reading and mathematics. It is possible that some critical performances are missed by such a sampling method. If the performances that were observed had proved to be unrelated to student learning, then two alternatives would have been worth considering: one, that these other performances are also not likely to be more effective; or that sampling other kinds of occasions or days may have produced performances that were effective.

The problem of what periods to observe was solved by having APPLE observers observe all day. RAMOS observers were present during the morning and focused their attention primarily on the reading and mathematics periods when they occurred. Generally, the RAMOS observer inquired of the teacher what the afternoon's activities would be, and if there was to be an instructional period in reading or mathematics in the afternoon, the observer remained for that period but did not remain for other kinds of activities in which neither reading behavior nor mathematics behavior could be observed.

What we have obtained is a sample of occasions on which the teacher was engaged in instruction in reading and mathematics. If these days are not representative of the teacher's performances, then we would not expect to find relations between performance and learning or the relations would be attenuated. If, however, we find relations between performance and learning, then it may be concluded either that these performances represent the teacher's general level of performance or that on occasions that observers were not present the teachers may be more effective. But when we find relations, we know that we have obtained at least a subset of performances related to student learning.

Sampling Within Classes

There are two sampling problems once the observer is in a classroom. One problem is what to observe, the other, whom to observe. As we suggested above, the unit of observation ought to include both the teacher behavior and the student behavior. This requirement places great practical difficulties on the observer which were solved in the following manner.

We assumed that it was impossible to observe all of the students in the class, but that by observing a sample of students we could obtain a representative sample of student behavior and of teacher behavior with respect to those students observed. We could have picked students at random from the class and observed them and the teacher. The sample of pupil events, however, was likely to be more representative if the students were selected in terms of certain characteristics. Therefore we chose to set up a sampling frame in which the two major dimensions are the teacher's expectations about the child and the child's achievement at the time of the fall testing.

Two pieces of information were available for each child. Each teacher had rank-ordered each child in terms of how he or she expected that child to perform during the year in reading and mathematics, so each child's rank as provided by the teacher was available. Second, the children had taken the fall test battery prior to the observation period so that their scores in reading and mathematics were available. We selected from this battery the reading comprehension score and the mathematics computation score of the California Achievement Test as the achievement measures for ranking the pupils' achievement.[12]

Eight "target" children were selected in each classroom by using the fall reading performance data and the teacher rankings of expected level of reading achievement. The students in each class were classified in the matrix below by the procedures described in the next paragraph:

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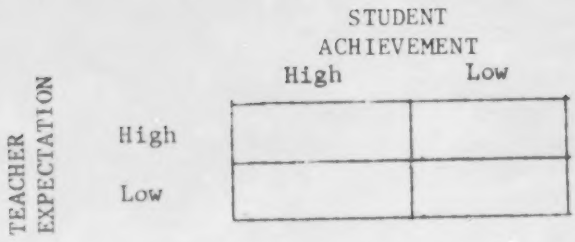
[12] These scores were selected because of their known reliabilities. Other scores correlated significantly with these scores.



The children in each classroom were listed in the order of their teacher's ranking of their expected reading performance. The ranks were split at the median. The sorts were made separately for reading and mathematics, but the target students were selected by using the reading matrix except where data were not available. In such cases, mathematics data were used. Each class was sorted on its own median. By selecting the median of the scores for each class, the child is sorted with respect to his or her own group, the group against which the teacher was asked to make predictions for each child.[13]

The target pupils were selected by picking randomly one boy and one girl from the top, from just above the middle, from just below the middle, and from the bottom of the distribution in each classroom. An appropriate alternate pupil was chosen for each target pupil in the event the target pupil was absent. In this process of selection, the ethnic distribution of the class was preserved. Rules were established

[13]Note that the teacher was asked to predict how the child would do that year with respect to other children in the class. The teacher was not asked to evaluate the child's performance in relation to the norms for other children. The teacher was not asked whether the child was at, above, or below grade level. The rank-ordering, therefore, is in relation to the performance of other children in that class. It may be that the teacher's prediction was influenced to some degree by his or her perception of the overall level of the class's achievement, but if this were the case, it did not affect the selection of the target pupils.

for selecting minority group members in proportion to their representation in the class. The eight children (and their alternates who were to be observed in place of absent pupils) were the "target-pupils" who were observed during the observation period. The observers were given a list of the names of the pupils to be observed and of their alternates. They did not know into which cell of the stratification matrix these children had been placed.

The resulting sample is balanced in terms of males and females and is representative in terms of ethnic distribution. The balance between males and females was deliberate because we wished to determine if teachers acted differentially with respect to boys and girls. For the most part classes were relatively balanced in terms of the number of boys and girls in them though there were some deviations from an equal distribution. By selecting an equal number of boys and girls in each class, there is an equal probability for observing interactions with boys and girls; the observations would not be weighted by the difference in numbers of boys and girls.

The assumption underlying this method of sampling is that the teacher is more likely to interact with children in terms of their prior achievement and his or her expectations about performance than in terms of any other factor. But by including both boys and girls in the sample and making the sample representative in terms of the ethnic distribution of the class, it is possible to determine the degree to which these other two factors influence the teacher's interaction patterns.

It will be useful to the reader to refer back to Figure 4.2a to consider the sampling plan for observations used in this study. First, the sampling by occasions: (1) the months of the year sampled were February through May; (2) the days of the week sampled were the three middle days of the week; (3) the periods of the day were periods in which reading and mathematics were taught which usually covered the morning half of the day, and for one observational system (APPLE) the afternoon was observed. Second, sampling by subjects: the teaching of reading and mathematics were the events observed. Third, sampling by children: a subsample of eight children in each class was observed in which the children had been selected in terms of teachers' expectations and the children's achievement, and in which the sample was balanced in terms of boys and girls but representative in terms of ethnic distribution.

Consider the breakdown of the dimension of children into the subdimensions of teacher expectation, achievement and aptitude (Figure 4.1a). Two of these subdimensions have been sampled, teacher expectation and student achievement. Aptitude scores are so highly correlated with the achievement scores that it is necessary only to sample two of the three dimensions. Other characteristics of children could be sampled; we have chosen those which on theoretical grounds seem to be the most salient dimensions for selecting the children to be observed.

Consider now the breakdown of the dimension of subject (Figure 4.1c). We have indicated that the two major subjects, or content areas, which were observed were reading and mathematics. The learning task was identified during the period of observation by the context in which the child was placed for the learning activity; for example, if the child was working alone, this context was noted, and similarly, if the child was working in a group or with the class as a whole. The objectives dimension was recorded during the observation period by indicating the nature of the activity that was underway. If the teacher was working on decoding skills, the observer recorded this information. Similarly, if the teacher was working on reading comprehension or mathematical computations or mathematical concepts, this information was recorded as part of the observational data. Information on these dimensions is complete for the occasions of observation.

As can be seen from the descriptions above of the sampling system, the weakness in the system may be the occasions on which the observations were made. An argument has been given for the usefulness of observing in the latter half of the year. This argument is of limited value if in fact the most effective teaching occurs early in the year. But it is reasonable to assume that the teachers may be performing more effectively later in the year because they have acquired experience with the students and because they may be trying to accomplish their goals with greater energy as the end of the year approaches. On the assumption that the teachers know the days on which their performances

are most typical, by observing primarily in the middle of the week we probably are obtaining a representative sample of the days on which the teachers are most engaged in instruction. But there is no way to demonstrate this representativeness by the sampling method.

For the purposes of this study the approximate sampling units are the occasions on which the teacher is operating at maximum instructional performance. No one knows what these occasions may be. It is reasonable to assume that they will be days on which teachers think they are more likely to be effective and on days when they feel that other factors are not interfering with their performance. It is also reasonable to assume that the accumulated experience of the year contributes to more effective performances. The issue, therefore, is that even though we have not sampled occasions randomly, have we increased or decreased the likelihood of finding occasions on which teachers are likely to be effective? It seems reasonable to assume that the probability of finding such occasions, if it has not been increased by the methods used, certainly has not been decreased.

Facet Design of the Observation System

The reader will recall that a figure was presented in Chapter 1 which describes the major dimensions of the measurement system. It will be useful to relate the previous discussion in this section to that figure which is reproduced at this point. Figure 1.2 indicates there are three facets that may be measured, persons, conditions, and situations/response. In the framework of the

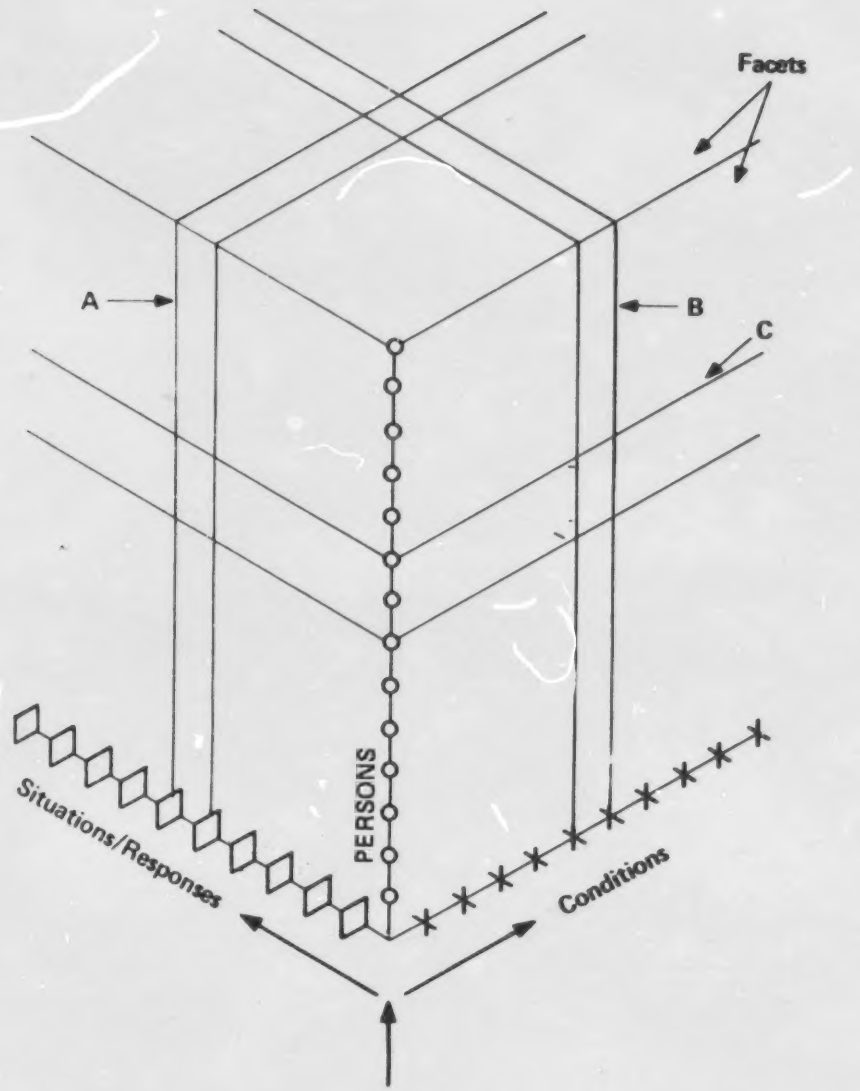


Figure 1.2. The Principal Dimensions of a Data-Matrix for a Multivariate Study

*If a "cut" is made in the data, such as at A, then the data-set is a persons X conditions set. If a cut is made as at B, then the data-set is a persons X situations/responses set. If a cut is made at C, the data set is conditions X situations/responses. Thus any data-set built around the three dimensions may be analyzed in terms of these three facets.

observational system on the persons dimension, there were two kinds of persons observed, the teacher and the child. On the stimulus/response dimension in the context of the observational system, the stimuli for the child include the range of teacher performances, the nature of the learning tasks (which include the objectives, and materials of instruction). For the teacher, the stimulus situation includes a variety of characteristics associated with the children and with the characteristics of the school within which the teacher is teaching.

The conditions dimension includes for the children the composition of the class in terms of the characteristics of the children and the characteristics of the school in which instruction is occurring. It should be noted that there are three levels at which the conditions in which children are learning may be sorted. One level is the school and community characteristics in which the instruction is occurring; the second level is the composition of the group in which the instruction is occurring; the third level is the particular conditions of instruction associated with the characteristics of the teacher, the specific teaching performances which mediate instruction, and the nature of the learning activities in which the child is engaged.

The purpose of a facet design of the kind embodied in this study is to permit a variety of subanalyses by looking at points along the dimensions taken two at a time. It is possible, for example, to study the characteristics of the learning tasks as they relate to the

conditions of instruction. Such an analysis would first sort children into groups in terms of comparable levels of achievement and expectation; for example, all students of high prior achievement for whom the teacher has high expectations and a contrast group of students of low prior achievement for whom the teacher has low expectations. These groupings can then be studied in terms of the nature of the instructional context and teaching activities to which they were exposed.

The Selection of the Observational Systems

A number of observational systems have been developed and used in research on teaching. We considered a number of the best known and most widely used of such systems and evaluated each by applying several criteria.

The first and most important criterion was that the system had to gather a relatively rich sample of pupil behavior at the same time that the teacher's behavior was being observed. There were two reasons for using this criterion. First, teacher behavior or performance is influenced to some degree by the characteristics and actions of the pupils being taught. Second, pupil behavior may be an intervening or mediating variable between instructional stimuli and learning.

The second criterion was that the observational system must gather a diverse sample of teacher performances. One reason for using this criterion was related to the purpose of this study which was to generate hypotheses about the relations of teaching performance to pupil learning. What is observed should not be arbitrarily restricted if the potential pool of correlates is to be as large as possible.

Second, the public-policy purposes of this study would not be served well if a particular point of view towards teaching were adopted as a basis for observing teaching performances. The ultimate goal of the Beginning Teacher Evaluation Study is to develop standards for educating and licensing teachers. The purpose of the research program is to provide an empirical base for setting such standards. If a particular point of view were taken towards what constitutes effective teaching, the research program would provide information about teaching only from that perspective. Since teachers do not adhere strictly to one theory of teaching but rather tend to be eclectic and pragmatic, it would be unwise to set standards based only on one view of effective teaching unless there was very strong evidence that the point of view had validity. Such evidence for any theory of teaching or concept of effective teaching does not exist.

Another reason for not selecting instruments and methods built from a particular theoretical point of view is that existing theories are very general and not linked to specific educational changes in children. In this study the goal was to find the connection between teaching performances and specific changes in learning. One such change is acquisition of decoding skills. There is no theory of instruction which relates teaching performance to the learning of such skills.

A third criterion was that the observational system must provide information in three categories of teacher performance: (1) how instruction was organized; (2) how the teacher interacted with pupils; (3) the content and goals of instruction. Many systems do not provide information on the content and were ruled out for that reason.

A fourth criterion was how useful the system had been for finding relations between teaching and learning. With many systems some significant relations have been found but few related teaching to the kinds of pupil learning measured in this study. Several of the latter were seriously considered but were subsequently ruled out because they did not meet one or more of the other criteria. Instruments were not used because they seemed unlikely to provide the kind of data this study needed to achieve its goals. Nor did we think that new instruments had to be developed for this study.

The reader should not conclude that we rejected theoretical conceptions of effective teaching. Rather our point of view was that the validity of such theories was not sufficient to risk limiting the scope of the observations to those prescribed by a particular theory. Theoretical constructs and models influenced the development of the systems used but these systems are not formal representations of a particular theory.

After study of existing and available observation systems, two were selected, APPLE (Anecdotal Processing to Promote the Learning Experience), developed by Nadine Lambert of the University of California

at Berkeley, and RAMOS (Reading and Mathematics Observation System), developed by Robert Calfee of Stanford University. These systems were selected because they did provide a rich collection of information about teachers and pupils; they provided information in a variety of categories including the categories of interest; neither represented a particular view of what constitutes effective teaching; and, both had proven utility for finding relations between teaching and learning.

Two other important reasons influenced the selection of these systems. Our goal was to create a data-base which had two characteristics. First, the data should be as close to a transcription of actual events as possible short of making continuous video and audio recordings. Second, the data as collected should be free from theoretical pre-conceptions of what to observe and of interpretations of what a perceptible action means.

The basic descriptors used in APPLE and RAMOS portray what is readily observable in classrooms in the language in which these events are usually described. Both systems, for example, describe how the pupils are grouped for instruction and how many pupils the teacher is instructing at a particular point in time. Each describes the materials and methods of instruction and what is being taught.[14]

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[14] The advantages for understanding teaching of this kind of information are numerous. We can learn the frequency of occurrence of the basic modes of instruction. We can learn what varies from teacher to teacher and what this variance is. Another advantage is reflected in the remark of a reviewer of the draft of this report: "I see that children spend 50 percent of their time on the average in seatwork, but nowhere in the previous research on teaching does such a variable appear."

Such data can subsequently be analyzed in many different ways. They can be organized by using the techniques of factor analysis or latent trait analysis. They may be organized by the contructs of a theory or a hypothesis about effective teaching which may then be tested. With this data-base it is possible to generate a much larger number of hypotheses about effective teaching than can be generated from a data-base which contains observations relevant only to a particular view of the variables influencing effective teaching.

The Use of Video Recordings

Some readers will be curious as to why video recordings were not used if one wanted a data-base of the kind described. A video recording is a detailed and permanent record which may be coded in as many ways as desired. In fact we did videotape each teacher. The report of this work, conducted by Jonathan Sandoval of the University of California at Davis, is contained in Volume III, Chapter 3.

But there are limitations to the use of videorecordings as the basic source of data. The video camera is a very limited recorder particularly in elementary classrooms. The camera's eye has limited flexibility; its angle of vision is less than that of a human observer. and it cannot swivel as quickly as the human head. The sound system is so highly sensitive that the audio track contains much noise, and it is difficult to pick up clearly the interactions between the teacher and the pupils. These technical difficulties can be reduced but at the expense of changing the nature of the classroom events.

The second disadvantage is economic. The best use of such tapes is achieved when the audio track is transcribed, but the ratio of transcribing hours to recording hours is on the order of five to one. The transcription process is obviously costly, the reduced pace of the data analysis is much slower.

A third disadvantage is that some events which can be seen in the classroom cannot be detected easily or reliably on the videotape. Facial expressions is the best example of this problem. The camera operator would have to know when a teacher was going to smile to adjust the camera to a closeup. Even if the camera is on close-up, some facial expressions are difficult to code. In the live situations movements or gestures reduce the ambiguity.

The consequence of these limitations is an investigator is faced with a dilemma. A high fidelity videotape can be produced only at the expense of making the classroom less naturalistic. We then see what occurs when teachers and pupils are in an electronic classroom. Or the investigator can restrict the intrusiveness of the medium but obtain low fidelity in the videotapes.

This problem was exemplified in Sandoval's study. Sandoval attempted to use the complete APPLE and RAMOS systems with the videorecording, but he found that the tapes did not provide enough information to make the complete system usable. Many events of the kind picked up by the human observer could not be seen or heard on the videotape. He developed a new coding system which included some APPLE categories and new categories which coded events discernible on the videotapes.

In this study we did not have to choose between the human and the electronic observer. We planned to make both kinds of observations and to compare them. But we found that the two systems could not be applied completely to the electronic observations. Sandoval reports the reliabilities and relation to pupil learning of the revised APPLE codes. The analysis of these and his other codes represent what was learned from videotapes about teaching effects in this study.

We chose at this stage of the research not to include the data from the videotapes in the major analyses reported in this volume. Much analytic work needs to be done to relate and to integrate the two methods and we had neither the time nor the resources for this work. We also had more live observations than videotaped observations. These were similar in character and presented a fuller record of the teaching events. We concluded that the live observations were more likely to be a better data-set for estimating teacher effects.

Limitations of the Live Observer

The live observer is not a perfect recording instrument. Some difficulties are inevitable. There are many events to observe and some occur rapidly, so the human observer may either miss some events or have difficulty in recording them. This problem was ameliorated only in part by the techniques employed by the two systems and by the methods used to sample behavior.

The use of "target" pupils (previously described) reduced the number of events that an observer had to record. The sample was stratified in terms of the pupils' characteristics and the pupils

were randomly chosen. The observers were also instructed to note any unusual events to capture incidents that would affect instruction but might not involve the target pupils. It is reasonable to assume that the recorded events were a representative sample of teacher and pupil behavior.

The human observers will differ in the rate at which they note events particularly when many different events are to be recorded. Other systems of observation have coped with this problem by reducing the number of events to be recorded or by taking a time-sample. However, we chose to make continuous recordings and therefore differences among observers will appear. Some of these differences are probably stable and some temporary. This problem will be discussed in the section in this chapter on reliability of observations.

Summary of the Common Characteristics of the Observation Systems Used

Before describing each system it will be useful to review their major and common characteristics to emphasize the decisions that were made in selecting these systems.

1. All observations were live. This procedure was used to obtain a record of the natural situation.
2. Both systems recorded events continuously to preserve the sequence of events.
3. Both systems gathered a wide variety of information on teachers and pupils so that the interrelations among different actions could be studied.

4. Observers focused on "target" pupils who were a representative sample of the class.
5. Both systems require the observer to record the event as seen with no interpretation as to its meaning.
6. Neither system restricts the observer to recording some events but not others.

The result of using these procedures and systems is a very rich data-base. But this richness creates problems in the analysis of the data which will be discussed later in this chapter. Not all of the analyses that can be made from this data-base could be done for this report.

The APPLE System

In this and the next section the APPLE and RAMOS system are described. Both systems are described in greater detail in Volume III, Chapters 1 and 2. Our purpose here is to provide the reader with enough information to understand what information was gathered and how. We will call attention to sections of these chapters which might be of special interest.

What the Observer Recorded

An APPLE observer was provided with a set of forms. A copy appears in Figure 4.3. Note at the top right-hand corner the boxes which identify the time and location of the observation and the observer. These boxes are filled in by the observer.

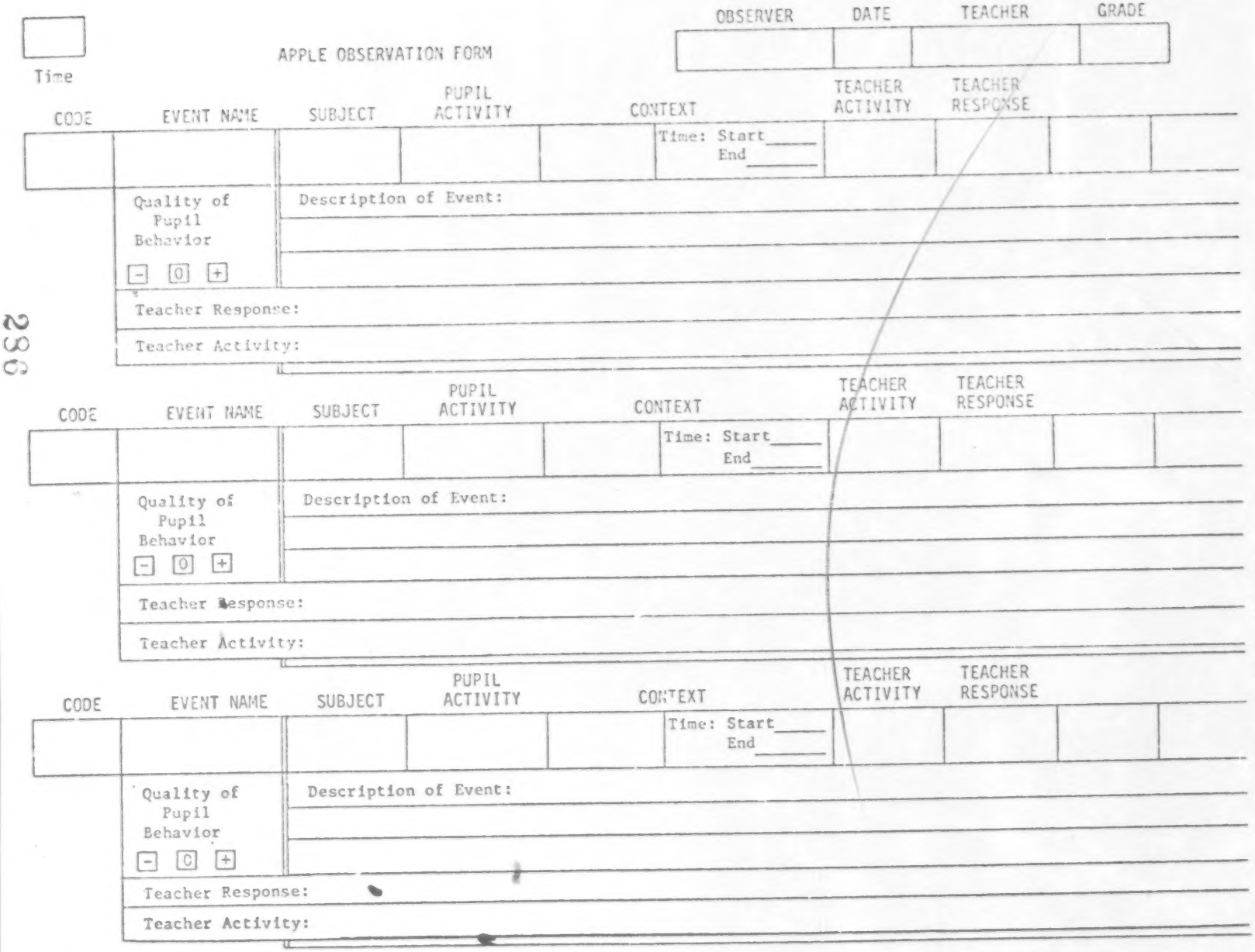

Figure 4.3

APPLE Observation Form

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The page has three major and identical "areas." These are filled in as the observer describes what a target pupil is doing. The observer recorded the name of the target pupil being observed. Once the observer begins to watch target-pupils, he or she describes what that pupil is doing, what the teacher is doing, then moves to the next pupil.

The observer is required to make certain entries at each observation of a pupil. First, the "Context" and "Start Time" is recorded. The "Context" is the instructional grouping in which a pupil has been placed and includes such arrangements as when the child is in a group which the teacher is teaching; or, teacher-class, a situtation in which the teacher is working with the whole class; or, the child may be working independently on a personal assignment, a group assignment or a class assignment. When the context for a child changes, the observer records the end-time. The list of "Contexts" is in Appendix D, Volume III, Chapter 1.

As this observation of the pupil begins, the observer has recorded the subject being taught, either reading or mathematics. The observer also records the pupil activity. There are 21 reading activities and 15 mathematics activities. The reading activities include such activities as "assigned silent reading," "oral reading," "phonics," "literal comprehension," "main ideas," and "creative writing." These activities describe the general nature of the reading task in which the child is involved. Mathematics activities include such as "addition," "basic facts," "graphing," "word problems." The complete list of these activities may be found in Appendix D, Volume III, Chapter 1.

At this point the observer has recorded who is being observed, the subject being taught, the context in which the activity or task is being conducted, the specific activity, and the time that this activity in that context has begun. End time is recorded when the context changes.

The observer writes down what the child is doing and what the teacher is doing while the child is in any given context. The observer records any statements and actions made by the child. The observer records what the teacher says or does, what the pupil says or does, and what the teacher says or does in response. Information of these kinds is written in simple descriptive English. The observer does not interpret the meaning of actions or statements.

The observer keeps track of each target pupil. But because the work the pupils have been assigned is different, a report on one child may contain a single entry, e.g., "independent reading, child selects own book (the specific book is noted)," whereas there may be many reports on the target pupils working in a group with a teacher.

How the Observer Worked

The observer always checked in advance on whether reading and mathematics was to be taught on the day assigned for observation (see the section of the Management of the Observation System); the observation day was replaced if the teacher planned activities other than reading or mathematics. When the observer arrived at the school, he or she checked in at the principal's office. The observer always

arrived before the opening of school. After checking in, the observer met with the teacher to be observed, talked about the observation procedures and the teacher's plans and made sure that each child had a name tag (if for whatever reason the tags were not ready, the observer prepared them). The observer did not identify the target pupils to the teacher. At the beginning of the instructional day, the observer filled in the identifying information on the teacher, class, date, and observer's name. From this point on the observations proceeded.

As each observation began, the mandatory information was filled in--subject, context, pupil activity, and start time. Then an observation was made of each target pupil. After describing each target pupil, the observer focused on those pupils where more activity was occurring, as in a group being taught by the teacher. When the context changed for any target pupil, the observer noted the end time and began a new context description for that pupil. The observer continued these processes through the reading and mathematics period. The APPLE observers actually observed all day. For the purposes of this report only the observations made during reading and mathematics have been used.

At the end of the day or some other convenient period the APPLE observer talked to the teacher about the observations that had been made. The observer used a summary form for this discussion on which the observer had recorded for each target pupil the primary

pupil activity, the instructional material used, time in contexts, and productive time in context (Figure 4.4). The teacher reviewed this information to determine if what the observer had recorded as a pupil activity corresponded with what the teacher had been trying to do with each pupil. At this time the teacher identified what she was trying to do with and expected of each target pupil. This information was recorded as "focus of learning" on the summary form. The observer used this information to review the observations made and corrected the pupil activity record if she or he had misperceived the situation; for example, if the observer saw the pupil as doing recreational reading when in fact the teacher had assigned the pupil a specific book for a specific educational objective, the observer corrected the observation accordingly.

After the observer left the school, several hours were spent going over the forms to make sure that the pupil activity had been properly coded. The observer checked the forms for any errors made in writing down information. At this point the observer's notes were amplified, and the number code for each target pupil was entered. The review of the record with the teacher and the checking of the pupil activity constituted the first editing of the observations.

Coding of the Observations

These forms were mailed to the Berkeley Office of Educational Testing Service where the observation was logged in as completed. The forms were then sent to Nadine Lambert's staff at the University

OBSERVER SUMMARY REPORT

Observer_____ District_____ School_____ Teacher_____ Grade_____

Date_____ Time Observation Began_____ Time Observation Ended_____ Total Time (min.)_____

Total Enrolled_____ White_____ Black_____ Spanish_____ Other_____

Total Absent_____ White_____ Black_____ Spanish_____ Other_____

Code	Name of Pupil	P A	For Each Observed Pupil During Observation Period What Was:			For Each Context					* GSOP	** DLA
			Primary Pupil Activity	Material Used	Focus of the Learning	Context	Time in Context Min.	Time in Context % Tot. Time	Productivity Min.	Productivity % Tot. Time		
						1 2 3						
						1 2 3						
						1 2 3						
						1 2 3						
						1 2 3						
						1 2 3						
						1 2 3						
						1 2 3						

*Extent of Structure in Observation Period

1 = no structure evident
2 = some structure evident
3 = considerable structure evident
4 = activities were completely structured

**Differentiation of Learning Activity

1 = pupil assignment the same as everyone else in class
2 = pupil assignment the same as group and the group assignment not the same as the rest of the class
3 = pupil assignment individualized and not the same as any other child or class

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Figure 4.4
Observer Summary Report

of California, Berkeley. This staff reviewed each observation form, and if the staff had any questions about the information on the forms, they called the observer to clarify any seemingly ambiguous information. The coding staff then checked the coding of pupil activity on each form. These procedures constituted the second editing of the observation forms.

The forms at this point were ready for coding of the verbal descriptions. A lexicon was available for this coding which had been assembled from previous work with the APPLE system. The staff reviewed the observations to see how well the teaching activity lexicon codes subsumed the entries. Revisions were made in this lexicon on the basis of the review prior to the coding of Phase II observation data.

The coders had considerable experience using the lexicon. They had coded APPLE observational data for several projects. The procedures used on the data in this study to insure accuracy were:

1. Carolyn Hartsough, who worked on the development of the lexicon, coded the early observations. Her coding became the standard.
2. The other coders coded the same data and compared their coding to the standard and to each other's coding.
3. Disagreements were resolved and the rules for coding clarified.
4. The coders continued to compare codings until they no longer disagreed. Dr. Hartsough supervised the process until the standard was reached.

When the coding of all forms had been completed, the data were transferred to punch cards for analysis. Some 20,000 forms were processed to provide the basic data-set.

The Selection of Observers

With few exceptions the APPLE observervations were made by observers new to the activity. All potential observers were interviewed by the Educational Testing Service professional staff in Berkeley and associate directors of this project, and by Nadine Lambert and Carolyn Hartsough--Dr. Lambert is the developer of the APPLE system; Dr. Hartsough is an experienced APPLE observer and trainer, and was the data analyst of the APPLE data.

The following criteria were applied in selecting observers:

1. Each had prior experience in elementary schools as aides, school psychologists in training, or teacher education students.
2. They held no strong views about the best ways to teach reading or mathematics.
3. They could commit the time required over several months.
4. Their personal style in dress and manners was not likely to be unusual and obtrusive in schools.
5. They seemed to be prepared to cope with the scheduling crises that would inevitably arise, and were available on a regular basis.

Fourteen trainees were selected who met these criteria and successfully completed the training program. Seven were located in Southern California, and seven in Northern California. All but three were women.

Training of the Observers

Instruction and practice in observation was provided in an initial, three-day session. This session began with a description of the APPLE system and study of the manual. The project's goals were described. The observers were familiarized with the forms to be used. Examples of observations were presented and discussed.

Then each observer went with an experienced observer to an elementary school. No Phase II classrooms or schools were used as training sites. The trainee met the principal and the teacher to be observed and explained the purpose and method of the observation to them. Then the trainee and the experienced observer went to the classroom and began observing. Periodically they compared observations, the experienced observer explaining how and why she recorded as she had and answering the trainee's questions. They observed through the morning session.

In the afternoon all trainees and experienced observers returned to the project office. Each trainee explained problems she or he had had; these problems were discussed. Explanations of the project to the principal and teacher were reviewed.

These steps in observing and reviewing were repeated on the second day. On the third day all trainees met for an explanation of the coding to be done on their observations. Although the trainees were not to code their observations, it was important for them to understand the methods that were to be used so that the records would be completed properly. This day completed the formal initial training.

The reader will recall that each day's observations were checked by the staff and if there were ambiguities in the reports the observer was called. This checking was an integral part of the training process as well as a quality-control procedure.

The process of monitoring the forms continued throughout the period of observation. In this way the quality of the observer's performance was maintained.

After each observer had completed four days of observation for this study, the observers were assembled for a second training session. The staff had collected a list of problems by reviewing the observation forms. These problems were discussed. Observers presented problems they had experienced. Scheduling problems and what to do about them were also discussed at this session. A summary of these problems and recommendations was sent to the Berkeley Office for the information of Patricia Wheeler, Associate Director, who was managing the scheduling of observations.

The APPLE Metric

The original information gathered in the observations was organized in duration-frequency units. Each context was timed, the duration component of the unit; and events within these contexts were counted, the frequency component. This organization is probably the most meaningful organization and inspection of Tables 71 to 83 in Chapter 1 of Volume III suggests that teachers differed in terms of such groupings of the data. But to scale this information in this form would have

required more time and resources than we had available for this report. A different procedure was used to organize the observation information into scores.

After the observations had been coded, an analysis was made of the frequencies and distributions of each code (see pp. 44-62, Chapter 1, Volume III). Codes where the frequency was very small were dropped. The next step was to accumulate the data in a way that would allow differences between teachers to appear if they existed. The code frequencies were accumulated by the pupils of each teacher. These numbers represented a teacher's score for each code.

Since some teachers were observed more than others, a teacher's score was affected by the number of times she or he had been observed. To make the scores comparable across teachers, the total frequency of the observations for each teacher was computed. Then each code score was recomputed as a percentage of this total frequency.

A teacher's score in a timed code is an indirect measure of the time dimension and a direct measure of the proportional frequency of the event. The score <u>is not the raw frequency</u>. That the score is an indirect measure of time for those categories that have been timed can be seen by inspecting Table 4.1. In that table both the mean time in context and the percentage frequency for context are listed. As can be seen the percentage-frequency means line up in the same order of magnitude as the mean time in context. It is appropriate to think of the percentage frequency scores as indirect estimates of the time spent in context.

Table 4.1

APPLE Variables: Contexts--Average Prorated Frequency in Context Compared to Percent Time in Context

Grade 2 Reading (N = 41)	Average Prorated Frequency	$\bar{X}$ Percent Minutes In Each Context	Percent of Total Time In Each Context
I - Class	7.28	4.93	5.55
I - Group	28.87	34.40	36.20
I - Individual	5.08	8.33	9.08
T - Group	32.54	29.10	27.35
T - Class	8.66	11.28	10.52
Grade 5 Reading (N = 52)			
I - Class	19.49	26.22	25.66
I - Group	32.57	34.36	35.44
I - Individual	3.05	6.04	6.14
T - Group	24.63	18.84	19.00
T - Class	12.19	10.70	10.72

The frequencies and durations of the context codes correspond in magnitude and have the same relative magnitudes by category because the method of observation guaranteed that they would be ordered similarly. The observer was required to check on the target pupils continually. They were instructed to make no less than two observations every five minutes of every target pupil, and to make a record even if the context for a particular pupil had not changed. (The procedure kept the observers alert to changes in context.) Thus, the longer a child was in the same context, the more observations would have been recorded for him or her. If a child was assigned independent seatwork, for example, the observer would note the start time and indicate the context and pupil activity. Within every five-minute interval the child was in that context, the observer would make a record. The record would show a frequency of two for the first five-minutes, of two for the second five-minutes, and so on. Thus, the frequency in context for each child is colinear with the amount of time he or she spent in a particular context.

In thinking about the scores other than context scores of the APPLE variables the reader should keep in mind that the scores <u>are not raw frequencies but percentages</u> and that the frequency counts <u>are not time samples</u>. For untimed variables such as "teacher questions," the score for a code represents how many times teachers asked questions out of the total number of teacher behaviors. For the timed variables, the context variables, the percentage score reflects the proportion of time-spent by target pupils in that context.

The Analysis of the APPLE Data

The original APPLE data were analyzed at the University of California by Nadine Lambert and Carolyn Hartsough. The reader's attention is called to the several kinds of information in Volume III, Chapter 1. First, the frequencies and variances for each code are presented on pages 44-62. These data show the range in frequencies by code--some teaching performances occur more frequently than others, and some occur relatively infrequently. Some of the distributions are not normal.

The second item is the frequency of events within categories of other events. These data are presented on pages 153-182. These data suggest that there are structures of performance which differ from teacher to teacher. Some teachers consistently use one style of teaching, and others, another style; then there are teachers who mix the components of these basic styles.

Lambert and Hartsough analyzed by grade and subject the relations between each of the codes and pupil learning. The data are presented on pages 96-147. The analysis is useful for revealing which codes are most highly related to pupil learning. These analyses were used in creating superordinate categories of the basic codes.

The fourth set of data which deserves particular attention is the difference in the patterns of teaching performance between teachers whose classes differed in achievement. A procedure described in Chapter 8 of this volume was used to sort out classes in terms of differences in patterns of achievement. Lambert and Hartsough

describe the differences in teaching performances between the teachers whose classes differed the most. These data are presented in pages 153-182 of Chapter 1, Volume III.

The code scores and all other relevant data from the observation were forwarded to Educational Testing Service, Princeton. There they were entered into the master data tape. As the reader will learn in a subsequent section of this chapter, the APPLE data were reduced by creating superordinate categories so that there were fewer variables than there were teachers. New scores were created in this process, but the metric of the APPLE variables discussed in this volume was unchanged. Each APPLE variable is a score representing the percentage frequency of that variable in the set of variables.

The APPLE Scores

The observations made and encoded by using the APPLE system yielded fifty different codes. These original codes and their definitions appear on pp. 49-50, 52, 54-55, and 57 in Chapter 1, Volume III. The original data set contains more variables than teachers (with one exception but the number of variables in this case is very close to the number of teachers). It was obvious that this number had to be reduced by combining variables.

The procedures used to combine variables in this study were simple and were used in conjunction with more sophisticated analytic procedures. The process consisted of collecting variables into categories in terms of the common attributes of the original categories. Thus a two-step process of categorization was used. The first was the encoding of the observations. This encoding

consisted in matching a description of an observed event to a categorical description of events. An original code, such as "Circulating," included all events describing the teacher moving around the room; it is that class of events which have in common descriptions of the teacher moving from pupil to pupil or walking around the room, talking to pupils and looking at their work. The code name denotes the critical behavioral attribute of the observed events collected into the code.

The second step in the process was to study the fifty codes into which the original events had been grouped with a view to grouping them by what was common among sets of them. This analysis was influenced by knowing that each original event had been tagged in no less than four categories--the context of teaching, the nature of the teaching activity, what the pupils were doing, and the ways in which the teacher responded during interactive teaching events. The recategorization of the events preserved these dimensions.

This choice (to preserve the original dimensions) is based on a concept of the characteristics of the events rather than on a use of the covariances among the original events. The following small example is offered to clarify the alternatives at the choice point were recategorization of the variables was undertaken. Suppose that there were three variables, asking questions, giving feedback on performance, and moving around during instruction. Suppose that a substantial correlation between the first two had been found. They

could be combined into a single variable, reducing the set of three to two. Combining on the basis of the covariances among the variables is one alternative.

But the original three variables are interesting in themselves. An investigator may be interested in the variable, "asking questions," because it is assumed that this performance stimulates practice, covert rehearsal, and other internal processes that facilitate learning. The variable, "giving feedback on performance," is a class of events assumed to be necessary to modify responses. "Moving around during instruction" is assumed to be a behavioral control procedure, or a way of improving the teacher's scanning capacity, or a component of a monitoring system. It increases the teacher's "vigilance" and "signal-detection" capacity which in turn is likely to increase question-asking and feedback behaviors.

Each of these original codes may be related to measures of pupil learning. The report of this analysis of the APPLE variables is in Volume III, Chapter 1, pp. 93ff. The partial correlations reported there treat each variable as if it were an independent factor, which, of course, they are not as other data in that chapter make abundantly clear. This analysis is useful, however, for testing ideas about varaibles likely to be related to pupil learning.

The original observations were complex. Each observation was described in terms of pupil events and teacher events which were coded along several dimensions. Each dimension, such as teaching activities, contained many codes (see Tables 2-5, Chapter 1, Volume III). The basic codes of necessity combined similar pupil or

teacher events on the basis of the behavioral descriptions provided by the observer. These events had been described as literally as possible. A code such as "Supervising" included any teacher event in which pupils were working and the teacher was monitoring their work. A teacher with a higher score on "Supervising" had been seen in more events that had the requisite characteristics to be coded as "Supervising."

The codes represent a picture of the events that have actually occurred during the period of observation. A study of these events suggested that these codes might be collected in a way that would reveal systematic differences in the patterns of teaching. An analysis of the original codes showed: (1) each teacher's performances were a subset of the codes but these subsets were markedly different across the group of teachers; (2) some events occurred more or less consistently across all teachers, other events occurred relatively infrequently but a few teachers did these behaviors more frequently; and, (3) there was considerable intercorrelation among the codes.

One way to think about the differences in the code-scores is to assume each teacher is acting as if he or she had a theory of instruction. The teacher who more frequently assigns "seatwork," and moves among the pupils checking their work and asking and answering questions does so because he or she thinks this is an effective way to teach. Another teacher may spend more time working with pupils in groups where she too questions the pupils and answers their questions. These two teachers code scores would have different profiles. Therefore, one approach to analyzing these data is to organize them in such a way that such differences in instructional style will be apparent.

The next step was to analyze the data to see if the codes can be organized to represent different instructional styles. This analysis was made by thinking about a model of effective instruction and looking for variations on it. The reason for using this model as a frame of reference was that it represented the set of optimal conditions for learning.

There are five conditions generally believed to be necessary for effective instruction:

1. The learner must have an opportunity to see or hear and to understand what is to be learned.
2. The learner must be able, overtly or covertly, to try the responses or processes to be learned.
3. The learner's attempts to acquire what is to be learned need to be monitored to correct errors and misunderstandings; to facilitate making connections between what has been learned and what is being learned; to help the learner develop the skills of self-monitoring and independent learning.
4. The learner's task should be clearly defined or he or she should be helped in clarifying and defining it.
5. The nature of the task should be appropriate to the learner's present stage of development.

Individualized instruction in a tutorial mode is generally believed to be an instructional style which provides these conditions. The teacher is continuously available to the pupil for explaining, describing and

modeling what is to be learned; for clarifying the learning task; for helping the pupil set goals. There is ample opportunity for monitoring the pupil's performance, for clarifying misunderstandings and for pointing out relations. The teacher can progressively modify the methods and materials of instruction so that they are appropriate to the pupil's abilities, interests and previous learning. The teacher can stimulate, encourage and reward the pupil.

The teacher, of course, is teaching many pupils. Much of the teaching behavior seen in the classroom occurs because the teacher is attempting to provide optimal learning conditions for all pupils. Therefore, a relevant question is, to what degree do departures from the individualized-tutorial model influence learning? Are some forms of instruction functionally equivalent to the conditions provided in the tutorial model? Do some variations attentuate the effects of a variable? In the individualized-tutorial model, for example, instruction is given directly to the pupil, and is easily modified to meet the learner's needs; but in a class, the teacher will instruct the whole class or a group of pupils. Is this change functionally equivalent to the direct instruction component of the tutorial model? One suspects not. The level of instruction is usually "averaged". It is more difficult to make this instruction relevant to each child's interests. The pupils are more likely to wander from the work at hand. But the teacher will also work with individual pupils to provide special instruction. Perhaps the combination of group and individual instruction is also effective.

To create an effective instructional system for all pupils, other modifications are made. The teacher cannot interact as frequently with each pupil, but he or she may increase the number of questions asked and use the answers to clarify points that might never come up in individual instruction. Control of attention and task-orientation is easily maintained in individual instruction; teachers will use a variety of techniques in class, however, to control on-task performance.

The reader should understand that we are not claiming that the tutorial model is the standard against which all other forms of instruction should be evaluated. Rather it is a convenient frame of reference for organizing constructs by which alternatives or variations may be studied. This model generally includes those conditions that most people believe are necessary for effective learning. We then ask to what degree are these conditions provided by other forms of instruction. We also ask if there are forms of instruction which are equally effective. By organizing the constructs by which teaching performances will be analyzed around a model of effective instruction, we can both identify functional equivalents to the behavioral events of the model or discover new sets or combinations that suggest new models.

The Grouping of APPLE Codes

The original APPLE codes were combined into 13 categories. Each superordinate category represents a concept of an aspect of instruction.

Sets of these categories represent scales of the variables defined by the concepts. The following discussion presents the categories in the sets which represent a dimension of the instruction. The anchoring point of each dimension represents a feature of the individualized-tutorial model.

The dimension of direct instruction. A major function of the teacher is to present what is to be learned. She makes this presentation in several ways such as by giving a lecture (a continuous exposition of length), or by explaining (a briefer exposition), by demonstrating, or by questioning to elicit a conclusion. In individualized-tutorial instruction these presentations are directly available to a pupil; that is, the presentation is made to him personally. It is also adapted to his learning style, present stage of development, interests and ability.

If the teacher makes the presentation to a group, both of these features of individualized-tutorial instruction are presumably attenuated. If she makes them to the whole class, they are attentuated even more. Thus a dimension of direct instruction can be conceived of as running from direct instruction to the individual pupil to instruction to the whole class.

Five original codes were used to define three points on this scale: Teacher-Class (AP-7), Teacher-Group (AP-6) and Independent Instruction (AP-5). The "Independent" point is a sum of all pupil events in which the child was working alone. Three distinctions in

terms of the nature of the assignment were made in the original codes--whether the assignment was mode for every child in the class or for a group or for the child alone. The individual assignment while working independently is the point closest to the individualized-tutorial anchor but this event occurred very infrequently. Therefore, the sum of independent instruction contexts was used to estimate the availability of the teacher for working with each pupil irrespective of the pupil's assigned work.

These three points are a measure of only one dimension of individualized-tutorial instruction--the availability of the teacher for direct instruction. If the teacher is using the Independent Instruction context (AP-5), he or she must also interact directly with the pupils. Estimates of the amount of such interaction will be given by other category scores. It will be the profile of a teacher's scores that will define his or her instructional style, not the score in a single category. This point is important to remember when reading labels like Independent Instruction.

The dimension of monitoring pupil performance. In individualized-tutorial instruction the pupil's performance may be monitored more closely. When teaching a class it is impossible to monitor performance that closely. There are two groups of original

codes which are indicators of the degree to which the teacher is monitoring the pupil's learning.

One of these, Teacher Mobility (AP-11), is a measure of the extent to which the teacher moves around the room. We assumed that movement during instruction particularly when the pupils are engaged in seatwork is a necessary condition for monitoring performance, and a minimum level of such monitoring.

Another set is called Monitoring Pupil Progress (AP-9) and is composed of asking, answering and checking to see if work is being done correctly, instructions are being followed, and if work is correct. These three codes described teaching behaviors which were similar in purpose. Brief questions are used to assess pupil performance; answers follow questions which pupils have asked and are indicators that the teacher has recognized the need for the question. Checking is the more complete form of the performance. The category represents the highest level on the monitoring component of this dimension.

The dimension of feedback. In individualized-tutorial instruction feedback on pupil performance is given frequently and immediately. In teaching a class, it is not possible to provide every pupil with frequent and immediate feedback. But some teachers provide more feedback then others, and one would expect such differences to be related to learning.

Two categories of the original codes represent points on this dimension. One, Non-Responsiveness (AP-14), collects codes which

describe behaviors such as ignoring, moving on, no response and negative feedback. Such behaviors are the immediate sequels of a pupil response. This category represents the 0 to - side of the feedback dimension. The negative side is very infrequently represented so the label, "non-responsiveness," has been used.

Responsiveness to Pupils (AP-12), collects all the codes in which the teacher responds to pupils by providing some form of feedback. This category is a measure of the frequency of some form of positive feedback provided to students.

The dimension of on-task control. In individualized-tutorial instruction the interaction between teacher and pupil encourages on-task performance. In this situation the teacher also has more means available to maintain interest and provide encouragement and support. While teaching a class the teacher uses various forms of social control techniques such as redirecting the child's attention or disciplining him or her to achieve the same goal.

One category of codes represented points on this dimension. Social Control (AP-13), is principally an index of how frequently a teacher brings a child back to work by redirecting his or her attention. The behaviors are usually not punitive but the category includes codes called "disciplining" which are more direct ways of bringing pupils back to work. They occur very infrequently.

This dimension is scaled from 0 ⟶ ; that is, the performance may not be seen at all or in varying frequencies across teachers.

The dimension of complex instruction. In individualized-tutorial instruction there is ample opportunity for longer and deeper expositions or explanations, more opportunity for discussion and for sustained questioning and answering. These teacher performances presumably elicit more complex cognitive processes which foster deeper and broader understanding of what is being learned. In teaching a class the amount of such complex instruction may be reduced because the teacher is coping with different levels of progress.

This dimension is represented by one category, Developing Pupil Understanding (AP-10). This scale is from 0⟶. The category subsumes the codes of "explaining," "questioning and answering," and "listening."

The dimension of organization of instruction. In individualized-tutorial instruction explanations of what is to be done are usually brief, the teacher has to be sure only that one pupil understands what is to be done, and the materials for instruction may be readily at hand. But in a class the teacher must organize many pupils, not all of whom will understand the directions and some of whom will not follow them very well. Large amounts of time spent organizing and managing take away from instructional time.

Managing and organizing behaviors take many forms such as giving directions at the beginning of a lesson, helping a pupil get his materials together or working with him briefly to get him started or back on track. Codes defining these different forms of organizing and managing were collected into one category called Organizing and Managing (AP-8). The scale runs from 0⟶.

The dimensions of pupil behaviors. Pupil behavior was described during the observations. These events were described by codes which collected instances of productive behavior, inattentive and attentive behavior. Productive behaviors are events in which children answer questions correctly, solve a problem, read out loud well, explain a paragraph intelligently or ask a "good" question. Inattentive behaviors include instances of not participating in a group activity, wandering from the task and social diversions. Attentive behaviors embrace all forms of being engaged in the work.

Two dimensions are represented. The on-task dimension is represented by two points, attentive and inattentive behavior. The productivity dimension is represented by a scale running from 0⟶ .

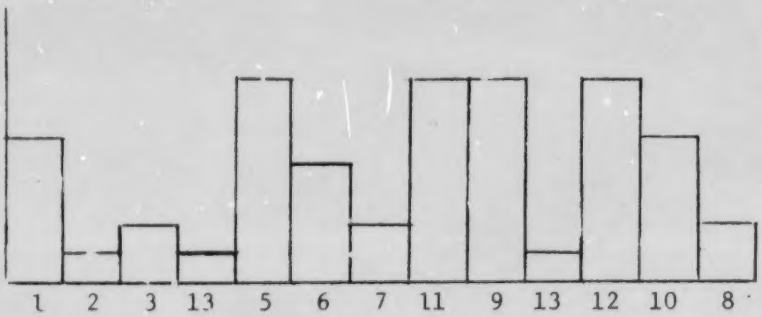
In individualized-tutorial instruction we expect greater pupil productivity because the learning steps are more carefully and individually sequenced and because more feedback in given. We also expect more on-task behavior because the teacher is working directly with the child. In a class these conditions are attenuated and we expect a higher level of inattentiveness and a lower level of productivity. But the teacher may be using teaching performances which facilitate productivity and attention. Therefore, these scores were used in two ways in this study. Their relations to learning were measured, and the effects of different teaching performances on these behaviors were also analyzed. The score on the productivity dimension is Pupil Productivity (AP-1); scores on the on-task dimension are Inattentive Pupil Behavior (AP-2) and Attentive Pupil Behavior (AP-3).

The Structure of the APPLE Scores

Each teacher has a score on each of these categories. These scores may be drawn as profile. Consider these two examples.

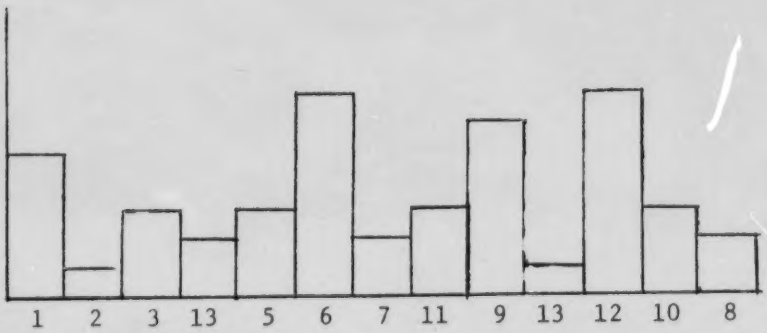
Teacher A:

% f



Teacher B:

% f



The APPLE scores are grouped by dimension along the horizontal axis. The frequency scores are along the vertical axis. For APPLE scores this frequency is a percentage score, the relative proportion of the events in that category to all events observed. Note the following possibilities:

1. Comparisons can be made along each dimension. About the same amount of pupil productivity has been observed in both classes. Teacher A uses more independent contexts (AP-5) so is further toward that end of the direct-instruction dimension.
2. Comparisons can be made within a dimension or by category. Teacher A uses more complex presentational techniques (AP-10).
3. Comparisons can be made by considering two or more dimensions. Teacher A uses more independent instruction (AP-5) and methods for developing pupil understanding (AP-10); but Teacher B uses more group instruction (AP-6) and less developing of pupil understanding (AP-10).

The APPLE scores are a four dimensional structure. A teacher's location with respect to these dimensions defines how a teacher is teaching. This description was made for each specific observation session. The prorated frequencies across sessions is an estimate of the mean of the teacher's scores with respect to each dimension.

Major Dimensions of APPLE Scores

The APPLE scores have four major dimensions:

1. Pupil Behavior: this dimension has two components, pupil productivity (AP-1) and task-involvement (AP-2, AP-3).
2. Teaching Context: this dimension has four components, independent seatwork (AP-5), teaching to a group (AP-6) and teaching the class-as-a-whole (AP-7).

3. Teacher Activity: this dimension has four components, organizing (AP-8), monitoring pupil progress (AP-9), developing pupil understanding (AP-10), and teacher mobility (AP-11).
4. Teacher Responses: this dimension has three components, responsiveness to pupils (AP-12), social control (AP-13), and nonresponsiveness to pupils (AP-14).

A teacher's score on AP-1 (pupil productivity) is an estimate of how well the pupils are doing during the class. A low score means that pupils are making mistakes in answering questions or are working problems incorrectly or reading poorly. Any evidence of poor work contributes to this score.

The task-involvement of the pupils is estimated by AP-2 and AP-3. A high score on AP-2 means that the pupils are not engaged in the assigned work; whereas, a high score on AP-3 means that they are. The reader should not assume that these scores are necessarily negatively correlated. On-task behavior is a variable phenomena among young children. Nor should the reader automatically assume that AP-1 and AP-3 will be positively correlated. AP-1, pupil productivity, depends in part on the teaching techniques being used. A teacher who asks many questions might have higher AP-1 scores if his or her pupils know the answers.

The context dimensions, AP-5, 6, 7, estimate the frequency of use of these ways of grouping pupils. A teacher with a high score on one of them, for example, AP-5, will usually be seen with his or her pupils working at their desks. Some teachers will use mainly one context, others will use two or three. The teacher's pattern probably reflects the assumptions the teacher is making about

effective ways to teach or his or her desire to make the teaching more efficient. A teacher who is trying to provide individual instruction will probably use AP-5 arrangements more frequently.

The performances AP-8, 9, 10, 11 represent the major ways in which teachers conduct lessons. Teachers spend time organizing instruction (AP-8); they ask and answer questions in rapid succession, the questions or answers being short statements directly to a point (AP-9). Or they give explanations, hold a discussion, listen to pupils read or explain their answers to a problem, or engage in a socratic-like dialogue in which they ask questions (AP-10). They may be seen working at the board, or sitting at their desk, or moving around the room observing their pupils' work (AP-11). These are characteristic ways of acting in the classroom. Some teachers do all of them, some do one or two. There are teachers, for example, who spend a considerable portion of the class time at their desks while their pupils work at their desks. Others may be seen moving around the room as their pupils work, and the teachers asks a question periodically (AP-11). Others spend more time explaining and discussing (AP-10).

Teachers in the elementary school interact very frequently with their pupils. Interaction is a continuous pattern of events embedded in instructional contexts and teaching activities. Teachers answer hundreds of questions and make hundreds of comments. These are brief events. But teachers differ in their behavior in these events. Some in commenting will invariably praise a child; others will mix praise and correction responses. Some of these behaviors are directed to keeping the child involved

in the work or activity at hand. A common pattern discovered in the course of this study is to ignore an answer to make no response at all. While such a reaction may appear unwarranted to some, the teacher frequently has a reason for this seeming neglect or indifference. Some pupil behavior is inconsequential and the teacher ignores it. A teacher does not want to embarass a child who has given a poor answer, so the teachers moves on to another child for an answer.

AP-12, 13, 14 are estimates of the frequencies of these kinds of interactions. AP-12 includes all the positive responses such as praise or positive reinforcement which a teacher makes to what a pupil says or does. AP-13 estimates the frequency of the responses which a teacher makes to bring a child back on-task; most of these are gentle forms of social control such as redirecting a child's attention by asking him or her a question. AP-14 includes all the instances of ignoring an answer or moving on to another pupil.

The frequency of any of the scores described above is an estimate of the teacher's typical performance in that category. The set of a teacher's scores locate the teacher in a four dimensional space.

The Patterns of APPLE Scores

Most teachers will have scores on all the variables. The differences in the scores by variable represent different patterns of teaching. The purpose of the analyses in Chapters 7, 8 and 9 is to find how these patterns relate to pupil achievement.

The reader should be aware of the intercorrelations among these categories that appear in the data (the correlation matrices are given later in this chapter). These correlations differ by grade and subject; for example AP-9 (monitoring pupil progress) and AP-10 (developing pupil understanding) are positively correlated in the second-grade reading data, but have a zero correlation in the second-grade mathematics data. The meaning of such differences is that teachers teach reading and mathematics differently and fifth-grade and second-grade teachers teach differently.

The reader should also remember that all performances have been defined in terms of observed behaviors; and that these behaviors were grouped originally and subsequently again into larger groups in terms of common attributes which distinguish one set from another. Preconceptions of effective teaching did not determine how the original behaviors were collected or organized. The performances described in this chapter were organized to reveal positions along the major dimensions of a model of direct individual instruction. The study's analyses will tell us what the effects of the performances are.

The RAMOS System

The RAMOS (Reading and Mathematics Observation System) was developed by Robert Calfee and Kathryn Hoover of Stanford University. The concepts which define the categories of the system were developed by intensive study of elementary school teachers. These teachers had been observed several days a week for a year. The project staff talked with the teachers about what they were doing and why. Extensive records had been kept on the teachers and pupils and the pupils' reading skill had been measured with individual tests.

Calfee and Hoover developed coding forms and a manual for observing. These codes and their definitions embodied what they had learned by observing teachers. The system was extended to cover the teaching of mathematics for this project.

The RAMOS system is like the APPLE system in that it also collects a comprehensive set of observations on what children and teachers actually do. It also provides continuous recordings of classroom events. A complete description of the system is provided in Volume III, Chapter 2. There the reader will find details on the scoring system and basic information on the original codes. Intercorrelations among the original measures and their partial correlations with spring achievement scores are also given there.

In the following sections we provide a description of the system so that the reader will understand how the variables were developed that were used in the regression analyses of pupil achievement on teaching performances. In reading the next section the reader should refer to Figures 4.5, 4.6, and 4.7.

RAMOS START FORM

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GENERAL INFORMATION

SCHOOL/LOCATION	GR	TEACHER	DATE	OBSER	SER. CODE	TIME IN	TIME OUT
Sample	2	Smith				09 03	09 50

FOCUS

COMMENTS

GROUP INFORMATION

I.D.	LOCATION	INST	SUBJ	NUM	TARGET STUDENTS A	B	C	D	READING CURRIC.	MATH CURRIC.
1	AB	1	BNR	25						
2	V	1	R	10					GINN 360	
3	CDHJ		R	6					SULLIVAN	
4	RST		A	9						

FOCUS

COMMENTS Groups 2, 3, 4 formed at 9:12 from Group 1

INSTRUCTOR INFORMATION

I.D.	NAME	GROUP	SUBJ.	LOCATION
1	Smith	1	MBW	AB
2	Shaw	3	R	S

FOCUS

COMMENTS Mrs Shaw arrived at 9:41

CLASSROOM GRID

A	B	C	D	E
F	G	H	J	K
L	M	N	P	Q
R	S	T	U	V

Figure 4.5

School Sample
Teacher Smith

Page 1 of 2

RAMOS EVENT FORM

A 321 | B | C | D

TIME		STATUS	GROUP					INSTRUCTOR						CONTENT														RESPONSE									SERIAL CODE		
			GROUP I.D.	NUMBER	GAID	LOCATION	DENSITY	INSTRUCTOR I.D.	CLASSIFICATION	ROLE	AVAILABILITY	INTERACTION	MOBILITY	SUBJECT MATTER	READING		MATH						FEEDBACK		TASK	FOCUS	SOCIAL INTERACT	CONTACT	OUTPUT RATE	PERFORMANCE	ATTEN/INVOLV.	PHYS. ACTIVITY	NOISE	TARGET STUDENT						
															Main Skill	Second Skill	Main Skill	Second Skill	Main Material	Second Material	AIM	ACTIVITY	Pattern	Sign																
1 2 3 4		5	7	8	9	10	11	12	13	14	15	16	17	18	19 20	21 22	23 24	25 26	27	28	29 30	31	32	33 34	35	36	37	38	39	40	41	42	43	44	45	46	47			
0908	G	1	25	A	C	W	1	T	M	G	T	S	B	X X	X X	X X	X X	X X	X	X	X X	X	X	X X X	L	N	M	M	L	L	M	M	M						
0912	T	2	10	V	C	S	1	T	M	G	T	S	B	X X	X X	X X	X X	X X	X	X	X X	X	X	X X X	L	N	H	H	L	L	M	M	H						
0912	B	3	06	D	S	P	0	X	X	X	X	X	X	R	D	S	R	S	X	X	P	S	S	X X X	W	L	M	M	H	H	H	L	L						
0912	B	4	09	S	T	S	0	X	X	X	X	X	X	A	X	X	X	X	X	X	M	P	?	? ?	X	X X	P	L	H	L	M	M	H	M	H						
0912	B	1	00																																				
0914	T	9	27	W	?	D	1	T	M	S	T	S	B	X	X	X	X	X	X	X	X	X	L	X	X X	P	N	H	M	L	L	L	H	H						
0905		The teacher stopped to collect Red Cross money.																																						
0914	B	3	06	D	S	D								R	D	S	R	S			W	P	P	S S			W	L	L	L	H	H	L	L						
0918	B	4	11																																				
0918	B	2					1		N					R	D	S	R	A				C		P	S	Q	E	+	u	A	L	M	M	M	?	?	L	L			
0925	T	2													R	S	D	S				B	X	A	S	R				R		L	L			H					
0926	T	4			R			1		D	S	T	M	B												M	-	T													
0926	B	2																											S											
0927	B	4																											S											
0934	T	2					1		N	G	R	S			R	A										M	+	u	A		L	M	M	N	M	L	L			
0940	T	4																																						
0940	B	2			P	S	D	0						R	?	?	?	?				W				S			T	L	?	?	?	?	?	?	?			
0941	B	3						2	A	E		T	M												T	+	B													
1 2 3 4		5	7	8	9	10	11	12	13	14	15	16	17	18	19 20	21 22	23 24	25 26	27	28	29 30	31	32	33 34	35	36	37	38	39	40	41	42	43	44	45	46	47			
TIME			GROUP					INSTRUCTOR						CONTENT											RESPONSE												SERIAL CODE					

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Figure 4.6

A	B	C	D

School Sample
Teacher Doe

Page 2 of 2

RAMOS EVENT FORM

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TIME				STATUS	GROUP						INSTRUCTOR						CONTENT												RESPONSE									SERIAL CODE		
					GROUP I.D.	NUMBER		GRID	LOCATION	DENSITY	INSTRUCTOR I.D.	CLASSIFICATION	ROLE	AVAILABILITY	INTERACTION	MOBILITY	SUBJECT MATTER	READING Main Skill	READING Second Skill	MATH Main Skill	MATH Second Skill	Main MATERIAL	Second MATERIAL	AIM	ACTIVITY	FEEDBACK Pattern	FEEDBACK Sign	TASK	FOCUS	SOCIAL INTERACT	CONTACT	OUTPUT RATE	PERFORMANCE	ATTEN/INVOLV.	PHYS. ACTIVITY	NOISE	TARGET STUDENT			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
0	9	4	3	B	2						N		F	G	H								P																	
0	9	4	3	T	4						I		M	S	T	S	W	X	X	X	X					X	P	X	X	X	X	X	X	C	M	L	J	L	J	3	M			
0	9	4	4	B	2						2		F	S	H												P													
0	9	4	4	T	4			P	S	D	I		N	G	V	S	L	W	C	G	R					C		A	S	D	M	B	T	S	N	?	H	M	?	M	J			
0	9	4	9	T	9						L		M	A	T	M	B	X	X	X	X					X	X	X	X	X	P	+	U	P	N	L	M	X	X	H	M	L			
TIME					GROUP						INSTRUCTOR						CONTENT												RESPONSE									SERIAL CODE		

Figure 4.6

1 -4 Time:
24 Hr. clock
0000 Start file
0001 Gener info. line
0002 Group ID line
0003 Instructor ID line
0004 Continuation line
0005 General comment
0006 to
0050 Field-specific com.
0099 End file

Group

5 Status:
G Group
T Teacher only
P Part of a group
S Specific students
B Background only
N Not being observed

6 Group ID:
from START

7-8 Number in group:
01-99

9 Grade:
code from START

10 Location:
S Students seats
T Table for group work
C Circle grouping
G Game Area
D Desk of teacher
L Library area
B Blackboard
N Not fixed or moving

11 Density:
D Dispersed singly or in twos
S Small groups
C Cluster of majority
W Whole class together

INSTRUCTOR

12 Instructor ID
From Start

13 Classification:
T Teacher
R Resource teacher
N Intern teacher
A aide
V Volunteer
C Crossage tutor

14 Role:
N Instruction
F Facilitation
D Discipline
M Manage class
A Assess/diagnose
E Evaluate for mastery
P Preparation
S Supervise staff
I Independent

15 Availability:
A Available
N Not available
E Emergency
S Specific student
G Group being taught

16 Interaction:
T Instructor chosen
V Volunteers chosen by instructor
H Help sought by students
B Both student and instructor initiate
R Routine of turns

17 Mobility:
M Mobile
L Limited
S Stationary

CONTENT

18 Subject:
R Reading
L Language
M Math
C Science
S Social Studies
A Art/music
B Business of class
F Free choice
W Wait time
P Playtime, recess

19-22 Reading Skills:
DS Decoding, simple
DA Decoding, adv.
SS Structural analysis, simple
SA Structural analysis, adv.
SY Syllabification
WM Word meaning
DW Dictionary work
RA Reading aloud
RS Assign. silent reading
RR Recreational reading
CF Compre. lit facts
CH " main ideas
CR " relations
CE " external. infer.
CS " sequence
CA " apprec.
CC " conclu.
GR Grammar
PU Punctuation
PS Practice spelling
PP Penmanship
WA Assigned writing
WC Creative writing

23-26 Math Skills:
B_ Basic facts
S_ simple
A_ Advanced
F_ Fraction
D_ Decimal
%_ Percent, ratio, prob.
W_ Word problem
_+ Addition
_- Subtraction
_* Multiplication
_/ Division
_R Relationships
RS Set relations
GR Graphing
GE Geometry
ME Measurement
TM Time
$$ Money

27-28 Material:
B Book
C Chart/chalkboard
W Workbook
M Manipulative
P PaperPencil
E Equipment

29-30 Aim:
N_ New
P_ Practice
R_ Review
A_ Application
_C Concept
_S Skill
_F Fact

31 Activity:
L Lecture
D Discussion
S Seatwork
R Recital - reading res
Q Question-answer
A Audio Visual
G Game
V Visual demonstra.

Feedback

32 Pattern:
D Delayed verbal
M Immediate verbal
E Expression
P Physical contact
T Token
W Written

33-34 Feedback Sign:
+_ Positive
-_ Negative
B_ Both
_U Undifferentiated
_T Task specific
_B Both

Group Response

35 Task:
L Listen
S Speak
R Read silently
A Read aloud
W Write
P Physical act

36 Focus:
N Instructor
C Classmates
L Learning material
S Something else

37 Social Interaction:
38 Contact with instructor
39 Output rate
40 Performance
41 Attention/involvement
42 Physical activity
43 Noise

H High
M Medium
L Low
X None

Special codes:
X Stop code
? Uncertain

RAMOS

SUMMARY CODES

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Stanford, California
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Figure 4.7

How the Observer Worked

The observer on arriving at the school checked in with the principal and teacher. He or she had phoned in advance to make sure that the observation day would be a regular school day.

After the observer had met the teacher who was to be observed, the observer identified the target students who were to be the focus of the observation. These children were observed as members of a group because they were usually located in a group. (If the child was working alone, he or she was identified as a group of one.) In studying the forms presented here note that information is provided on all the children in the class. Each group is located and identified and its activities described. Thus though the target students are the focus of observation, all children in the class are described.

Each observer had a Start Form (Figure 4.5) and an Event Form (Figure 4.6). The observer began by filling in the Start Form. These categories on the Start Form were filled in: the name of the school, grade, teacher's name, date of observation, observer's name, and the time the observation began. Then the observer surveyed the activity in the classroom to identify how the pupils were grouped and assigned an identification number to each group. Using the grid on the right-hand side of the form (Figure 4.5), the observer then identified the location of each group by the letter representing the group's location on the grid and entered this letter in the column labelled, "Location". Each adult in the room who was instructing was assigned a number, and this number was placed in the column

labelled,"Inst.", opposite the group number in the "Location" column. In the column labelled, "Subject", a code was placed identifying the subject being taught (see Figure 4.7). The number of pupils in each group was listed in the column labelled, "Num.". Next, identification of target students was listed in the column, "Target Students". Curriculum materials being used were described in the next column. Additional information such as the teacher's or aide's name was written in the next row.

The form in Figure 4.5 actually shows more information than this initial listing and identification data. Note, for example, the codes listed under "Location". Read these in sequence from left to right. For Group 1, A and B indicate that the group was located in the A and B region of the grid. This group is the whole class as can be identified from the 25 under "Num.". 1 indicates that the teacher is working with the entire class. "B" means "class business" (see Figure 4.7); the observer has added an "NR" to indicate the business did not pertain to reading. Now note the entry on the next line under "Group Information". 2 under "ID", and 3 and 4 indicate that three groups have been formed, the letters under "Location" indicating where the groups are in the classroom, and the numbers under "Num." indicating how many children were in each group. In this way the next set of activities after "business" has been recorded. Reading across to the "Curriculum" column, it can be seen that Group 2 is working in the Ginn series and Group 3 in the

Sullivan series. Group 4 is doing art work (A under "Subject").

During the observation, the observer had recorded these activities on the Event Form (Figure 4.6). If he or she had time, the information was moved to the Start Form, or was entered there after the observation. The Start Form provides the information about the class at the beginning of the observation period. From that point on the observer is concerned mainly about filling in the Event Form. The Start Form is completed at the observer's convenience so that it provides a summary record of the location, organization and activity of each group in the class.

To understand the use of the Event Form, it is necessary to use the Summary Code (Figure 4.7). The observer had learned these codes and had practised using them, but always carried a copy of the Summary. Turn now to the Event Form (Figure 4.6) and the sample protocol in Figure 4.8. Figure 4.9 explains the coding of this protocol which appears in Figure 4.6. The explanation is of the first five lines in Figure 4.6. Also refer to Figure 4.7 for the codes.

The observer begins by filling in the first row. This line gives the base-line data for the class. It tells what the teachers and students are doing, and where and how. The Group is 1, in which there are 25 pupils, seated in a circle (Location code) in the A section of the room (Grid code). The teacher is with the group (Instructor and Classification codes--1,T). The teacher is managing the group (Role, M).

Figure 4.8

A Sample Protocol For a RAMOS Observation

Reading Class

This is a first-second combination with a teacher and a teacher aide. There are 25 children present when you start the START form at 9:03. All of the children are sitting on a rug near the teacher. They are planning the day and marking a calendar and counting the days that have passed. There are three groups listed on the board. No target children.

9:08 "Time to get to work. Green Group go to your tables. Yellow Group has free time. Blue Group come with me to the reading circle. Mrs. Shaw will help the Green Group when she gets here." There is general movement as children go to their assignments.

9:12 Six children go to tables and begin to work in Sullivan workbooks with markers and pencils. Nine others go to the crafts area. Five of these begin to cut and paste at a table, two begin to color, two more start painting. The other ten students get chairs and sit in a circle with the teacher by the chalkboard. She has a stack of Ginn Level 2 books. This takes some time and the teacher is giving verbal directions to children from her seat.

9:14 Two more children enter. One of them has Red Cross money. The teacher says, "I forgot to collect the money." Several children bring money to the teacher. The Sullivan children keep working through all the confusion. Everyone else is chatting and there is much movement. The two late-comers go to the crafts area and begin to weave.

9:18 "Everyone get back to work!" The teacher writes words on the board and has the group read them aloud. She writes known words with the same endings as hints. She smiles a lot. The children seem attentive, but it is impossible to tell who can read what.

9:25 "Open your books to page 13 and read the story to yourselves." They do so without help.

9:26 One painter paints another. The teacher moves to the painter and takes him to a "Thinking Chair." She gets a three-minute egg timer and leaves it with him. She speaks firmly about his behavior. The Blue Group watches the Sullivan children work. The rest of the children gather around the painted one. The teacher returns to the circle and tells everyone to get back to work.

Figure 4.8
(continued)

9:34 The teacher asks the child to her immediate right to read the first page, says, "That was very good . . . next." The children read in turn until the story is finished and then reread it one and a half times so that everyone gets a turn. The teacher tells everyone that they were "very good". They vary in reading ability.

9:40 "It is time for the next group. Do the next two pages in your workbook." The Blue Group takes their chairs to a couple of tables and begin to get out workbooks and pencils. The Yellow Group gets chairs and gathers around the teacher.

9:41 Mrs. Shaw, the aide, comes in and begins to check the work of the Green Group. She makes smiley faces for correct pages and makes plain circles around errors.

9:41 The teacher begins to talk with the children in the reading circle about a trip to the bakery. She elicits sentences, writes them if they are complete, and edits them.

9:43 The aide begins to help the Blue Group who raise their hands for help.

9:43 The teacher notices that the one in the "Thinking Chair" has not come to the circle. She says, "We will wait while you wash your hands." They do.

9:44 The aide begins to give ditto papers to the Blue Group who are finished with their workbook assignment. The painter comes to the reading circle. The story is continued.

9:49 The chart story is finished. The teacher says, "Oh, we have had a lovely morning." Everyone is quiet and looking at her. She moves around the room, touching individual children on the head. The ones she touches go to the door and leave for recess.

9:50 End of observation.

Figure 4.9 shows how this protocol would be recorded in RAMOS.

Figure 4.9

Explanation of RAMOS EVENT FORM

A Line by Line Translation of the First 5 Lines

Time Line 09:08

Status	G	-the students the observer sees are arranged in a group
Group Id.	1	-the codes on this line pertain to group number one
Number	25	-there are 25 students in the group
Grid	A	-the students are located in approximately the area described by box A of the classroom Grid
Location	C	-the students are grouped in a circle
Density	W	-the group consists of all the children in the class
Instructor Id and Classification	1T	-the teacher is with this group; her Id number is one
Role	M	-the teacher is managing the class
Availability	G	-the teacher's attention is focused on the group she is with
Interaction	T	-the teacher is controlling the interaction between herself and the class
Mobility	S	-the teacher is stationary
Subject Matter	B	-the class is involved with general management, not directly related to content or instruction. Because of this, the columns labelled Reading Skills, Math Skills, Material, Aim, Activity, and Feedback are crossed out. This indicates that codes in these fields would not apply.
Task	L	-the students are supposed to listen to the teacher
Focus	N	-the majority of the students' attention is focused on the teacher
Social Interaction	M	-there is a moderate amount of talking between students
Contact	M	-there is a moderate amount of involvement with the teacher
Output	L	-the students are not producing many responses
Performance	L	-the quality of the responses is not high
Attention/ Involvement	M	-the students are moderately attentive to the teacher
Physical Activity	M	-the students are wiggling about some, but there is not a great deal of movement
Noise	M	-there is a moderate amount of noise in the classroom

Figure 4.9

Time Line 09:12

Status	T	-the teacher's behavior is the main focus of this line
Group I.D.	2	-the codes on this line pertain to group number 2
Number	10	-there are 10 students in this group
Grid	V	-these 10 students are located in the area described by box V of the Classroom Grid
Location	C	-the students are grouped in a circle
Density	S	-this is a small group of children. (The rest of this line is read in the same manner as the one above.)

Time Line 09:12

Status	B	-this line will describe a peripheral background observation. The students involved are not the main focus of the observation
Group I.D.	3	-the students will be identified as belonging to group number 3
Number	6	-there are six students in this group
Grid	D	-their position in the classroom is described by box D on the Classroom Grid
Location	S	-the six students are sitting in their assigned seats
Density	D	-the students are loosely grouped
Instructor Fields		-these fields are crossed out to show that there is no instructor with this group. An ID number of zero is assigned in this condition
Subject Matter	R	-The students are involved in a reading activity
Reading Skills	DS RS	-the two skills being practiced by the students are simple decoding and silent reading
Math Skills		-none are being practised so these fields are crossed out
Materials	W P	-the students' materials consist of a workbook, a pencil and some paper
Aim	PS	-the aim of this exercise is to practice a skill
Feedback		-these students are not getting feedback so these fields are crossed out
Task Focus	W L	-the students are doing a written assignment -the students' attention is focused on their learning materials
Social Interaction	M	-there is some talking among the students
Contact	M	-the students are giving the instructor some attention
Output Performance Attention/ Involvement	H H H	-the students are attending to their work and getting quite a bit done. Also the quality of the work they are doing is good
Physical Activity	L	-the students are sitting quietly
Noise	L	-the students are not making much noise

Figure 4.9

Time Line 09:12

Status	B	-this line will describe a peripheral background observation. The students involved are not the main focus of the observation.
Group I.D.	4	-the students will be identified as belonging to group number 4
Number	9	-there are nine students in Group 4
Grid	S	-their position in the classroom is described by Box S on the Classroom Grid
Location	T	-the students are seated at a table
Density	S	-the students are arranged in small groups around the table with some sitting more closely than others
Instructor Fields		-there is no instructor with this group so these fields are crossed out
Subject Matter	A	-the students are involved in an art activity. Since no Reading and Math skills are involved in this activity, these fields are crossed out
Materials	M P	-the students are employing materials they can physically manipulate as well as paper and pencils
Aim	?	-the observer is not sure what the aim of this activity is
Activity	?	-because many of the children are doing different things, the observer cannot correctly describe the activity. It could be dealt with in a comment line
Feedback		-these children are not receiving any feedback so these fields are crossed out
Task	P	-the students are involved in a task which requires physical activity
Focus	L	-the students' attention is focused on the materials they are working with
Social Interaction	H	-there is a lot of interaction between students
Contact	L	-these students are not in contact with the teacher
Output Performance Attention/ Involvement	M M H	-while the students are involved with what they are doing, their output and performance are rated as medium
Physical Activity	H	-the students are moving around
Noise	H	-the noise level in the group is high

Time Line 09:12

Status	B	-this line tells us that group number 1 has disbanded and the students and teacher are described in the lines for Groups 2, 3, 4.
Group I.D.	1	
Number	0	

The data on the pupils can be found in the "Response" set of columns. The pupils are supposed to be listening to the teacher (Task, L) and they are paying attention (Focus, N); this attention is moderate (Atten/Involv.,M). When the observer has completed this line, the time is recorded (9:08).

From this point on a new line is started only when a major change in activity takes place; for example, at 9:12 Group 1 broke up into three groups (Group I.D, 2,3,4); the numbers in each group are in the adjacent columns.

The changes in location, number and density of the groups are indicated in the column, "Group". What each group is doing is coded under the major heading, "Content", and the pupils' activities under "Response". Group 3, for example, is working on reading silently (RS), the skill involved is decoding (DS). W indicates they are working in a workbook; P indicates they are also working with paper and pencil. The coding under "Aim" tells us that they are practising a skill (PS). Note under the "Instructor I.D." the marking 0, and under "Activity", S: these codes together indicate independent seatwork. In brief, the children in this group are sitting at their desks, using a workbook and paper and pencil, silently reading to practise decoding skills. The teacher is with Group 2. The G in the Availability column means the teacher is available only to Group 2 but not Group 3.

Note the time column. At each entry by reading across we can tell how a group's activity has changed. At 9:41, for example, an aide ("Classification", A) begins to work with Group 2.

The observer continued to fill in the Event Form through the reading period. Note, however, the observer has recorded information only when a change occurred. The feature of the RAMOS system of importance for this study is the distribution of time that it provides. Each activity for each group of children is recorded. Thus we know that Group 3, composed of 6 children has spent 37 minutes working independently; during this time they have been working on a decoding skill; and they have used two kinds of materials, a workbook and paper and pencil. As we will describe shortly, RAMOS variables are measures of time spent in different kinds of activities. Note also that how the teacher distributes his or her time may be easily calculated. The teacher in this example has spent 4 minutes managing the class, another 2 minutes managing Group 2, and 4 minutes managing the class; she then spent 8 minutes instructing Group 2, followed by 4 minutes disciplining a single student in Group 4. Her activities for the rest of the period are recorded on page two.

The same procedure was followed during the mathematics period, except that then the codes for mathematics content were used (see Figure 4.7). The RAMOS observer observed the reading and mathematics periods and also language periods. The data from the language period has not been used in the analyses provided in this report.

At the end of the observation periods, the observer filled in a summary form. The information on this form was discussed with the teacher.

The observer checked all the coding at the end of the day. If the activity in the classroom had been changing rapidly so that the observer could only write notes, these notes were translated into the appropriate codes. The Start Form was also completed if there had not been time to fill it in during the observation period. At the end of the week all forms were mailed to Stanford.

The reader unfamiliar with the elementary school classroom may be surprised by the "white space" on the Event Form in Figure 4.6. Activity does not change rapidly; pupils are set to work on a task, and their activity remains the same for a period of time. These relatively unchanging periods provide the observer with ample time to record activity in groups where more is going on.

Quality Control Procedures

The observers were encouraged to write notes whenever they were uncertain about the precise code to use. These notes were used in two ways. When the situation was rapidly changing, the observer made notes and subsequently coded from the notes. The forms were checked at Stanford by the editors as the forms were being prepared for keypunching. Any errors in coding were corrected at this time on the basis of the written notes.

All forms were sent at the end of each week of observation to Stanford where they were reviewed and edited. When necessary, the observations were returned to the observers for corrections of errors, or the observers were called and ambiguities in the coding or apparent errors were corrected.

One of the authors acted as the coordinator in northern California and an experienced RAMOS observer served in the same capacity in southern California. They frequently checked with the observers and were available for consultation with them. This process provided continuous in-service training to eliminate misunderstandings or to correct errors. The coordinators emphasized in these discussions consistent interpretations of the codes, explicitness about the focus of attention during the observations, and comprehensiveness in the coding.

Editing of RAMOS Forms

All forms were edited by one of the authors of the system. Editing consisted in checking for legality and plausibility of the coding. A letter for a code placed in the wrong column would be an illegal entry. Plausibility covered situations such as an entry that a teacher was instructing two groups without an accompanying entry to indicate that the teacher had either moved from one group to another or had combined the groups. When such errors were noted on the forms, the observers were called to verify the entries. When they could not be verified by phone, the forms were returned to the observer with specific questions whose answers would resolve the problem. Text editing was done on the WILBUR system to crosscheck all entries.

Selection of the Observers

The observers were all credentialed teachers except one who

was a graduate student at Stanford who had participated in the Reading Diary study and other research out of which the RAMOS system had been developed. College placement offices, school district personnel offices and the Claremont School of Education were used to recruit potential observers. Each prospective trainee was interviewed by one of the authors of the system. The characteristics sought in the observers were intelligence, appearance like school personnel, ability to comprehend the observation forms and availability. Both women and men were recruited.

Training of RAMOS Observers

RAMOS observers, like APPLE observers, were two groups, one in northern, the other in southern California. Robert Calfee and Kathryn Hoover were responsible for the training of both groups of observers. The methods of training of both groups were very similar. The steps in the training were as follows:

1. The RAMOS manual and forms were sent to each trainee. They were asked to study the manual. It was recommended that after they had thoroughly studied the manual, they try out the system in a local school. The purpose of this procedure was to familiarize the observers with the system, and by trying it out to identify the kinds of problems they experienced in understanding and using it.

2. The observers met for one day of intensive training. During this day two trainees were paired with an experienced observer. This group went to an elementary school classroom where they observed.

3. The day of observation was broken up into periods of observation and discussion of the observations. During the first observation session, the experienced observer coded and the trainees watched the class and the experienced observer. At the end of this session (15 minutes), the experienced observer and the trainees discussed the experienced observer's coding of the session.

4. The group then returned to the classroom for a second observation session. They chose a "target pupil" and the trainees and the experienced observer coded the session with this pupil as the focus of the observations. They compared codings during the classroom observation and then held a period of discussion of the codings outside the classroom.

5. During this same day the group coded another subject in the same manner.

6. At the end of the same day all trainees and experienced observers met for a group discussion of the day's coding.

7. The trainee-observers were encouraged to write notes when in doubt about the coding procedures. They talked with the developers of the system about these notes after the observations.

8. The gas crisis occurred early in the observations and replacements had to be found for a few of the original trainees. These replacements occurred only in southern California. All replacements were trained either by the developers of the system or by an experienced RAMOS observer, using the procedures described above.

Several aspects of this training and of the system should be noted. The observers were trained to a standard. Their coding of events had to agree with those of the observer. The codes are relatively easy to use. The only problem of consequence that an observer has is that activity in the classroom may change rapidly at some point. At these times the observer writes notes about events that he or she cannot quickly code. These events are subsequently coded. Given the character of the codes being used and the typical pace of events, most coding can be done quickly and accurately. Errors were eliminated by checking notes and by checking all codes. The review and text editing procedures at Stanford provided a way of checking the plausibility of the coding. Thus there were three checks on the original coding--the checking done by the observer, the checking of the forms at Stanford, and the text editing procedure.

The RAMOS Metric

The measures representing RAMOS scores are based on time-estimates. The first step in generating the scores was to accumulate pupil-minutes by code for each observation period. If ten pupils, for example, spent ten minutes in reading, their total time in reading was 100 minutes. If another group of ten children spent 20 minutes in reading, their total time was 200 minutes. All together 300 minutes had been allotted to reading. Suppose that a total of 200 minutes had been allotted to mathematics. Then reading time was 60 percent of the total instructional time observed and mathematics was 40 percent. (A complete description of the scoring

procedures and information on the distribution of time by codes and categories is given in Volume III, Chapter 2, pp. 16-35)

The total number of minutes across all observations of a teacher was computed for each code. The total number of observation minutes was then summed from these totals. Each code score was next computed as a percentage of the total minutes. Thus each code score was a percent score--percentage of pupil-minutes observed in that code.

The original codes were collected into twenty categories. A number of codes, as in the APPLE data, had very low percentages of pupil-minutes. These were combined logically into categories to produce the twenty basic categories which were used in all subsequent analyses. The intercorrelations among these twenty categories are presented in Tables 7, 8, 9 and 10, pages 36 to 39 in Chapter 2, Volume III. Many of these correlations were low as is the typical pattern in these data. But some patterns were obvious in them.

A pattern of direct individual instruction appeared in the second-grade reading correlations. Its components were seatwork with a book, workbook, paper and pencil; the aim was to practise and review skills; the teacher instructs and evaluates. Another pattern was composed of discussion around books and instruction involving new concepts; the teacher used the board. The low correlations across the components of these patterns suggests two distinctive patterns of teaching. The direct individual instruction pattern did not appear in the fifth-grade reading data.

"Facilitation" as an instructional mode was the main teacher role in the second-grade mathematics. This instruction is probably heavily dependent on the use of materials with considerable emphasis on practising and reviewing. The patterns are not as distinctive in the mathematics data for the second and fifth grades.

The reader in reviewing the regression analyses should remember that the RAMOS variables represent time-expenditures. A significant RAMOS predictor means that time spent in that activity predicts differences in learning. The time measure is a proportion of the total time.

The Dimensions of the RAMOS Measures

There were four major dimensions in the RAMOS measures. The first of these relates to the teacher's Role. One component was the amount of time the teacher spent as the main instructor; an example would be the teacher working with a group. Other components represent other teaching performances which were observable actions such as direct instructing, assessing, evaluating, and diagnosing. The dimension also included managing, facilitating and disciplining as well as preparing (as teachers do during class) and supervising aides. These last two sets are not directly instructional but facilitate instructional activity. See Figure 4.7, RAMOS Summary Codes, under the heading "Role" for the list of codes included in this dimension.

The second major dimension relates to the Aim of the instruction. It had two components. One described whether the goal was to learn new material, practise material already learned or review

learned material. The other described the content—concepts, skills, or facts. The two components describe the proportion of time spent on new or previously learned material and whether the content was concrete or abstract.

The third major dimension describes the Materials used during instruction. Its components are anchored to books and additional materials, including workbooks and other equipment. The dimension describes the variety of materials used in terms of the proportion of time spent using the different kinds.

The fourth major dimension describes the Pupils' Activities. These varied from listening (listed as "Lecture" in the Summary Codes) to participating in a discussion, to doing independent work at his or her desk, to answering and asking questions, to using audio-visual materials (a slide presentation of words which the pupils sound out is an example), to participating in a learning game.

These were the major dimensions used in the analyses presented in this report. Other codes were not used because to use them we would have had to find combinations of codes from which a structure of patterns might be developed. Teacher's availability during independent seatwork is an example. We had the data available on the Content dimension but have not used it in the analyses presented in this report. Many of the components of Content are of low proportional frequency and it is not easy to find ways to combine them. We had neither the time nor resources for the analyses that the full data-set deserves. We have, however, used the major codes which give most of the information gathered in the observations.

These four dimensions describe the major ways in which teachers differ. Some use a variety of materials, others use only the basal reader or mathematics text. In some classes the pupil activity is varied; in others, the work is mainly at the pupils' desks in their workbooks. Some teachers introduce more new content than others. Teachers vary their instructional behavior; some spend more time than others managing; some spend more time instructing and evaluating; some spend relatively little time in direct instruction.

We expect learning to vary as a function of the teacher's location with respect to these four dimensions. Teachers who spend more time instructing and evaluating but introduce little new material provide a narrower range of content. Teachers who vary the materials may have found different ways to present the content. Pupil activity should be appropriate to what is being learned; certainly not everything can be learned working at one's desk in a workbook. Thus a teacher's location with respect to the four dimensions defines that teacher's instructional style. Different positions with respect to the four dimensions describe differences among teachers in instructional styles. It is these differences in instructional style that we expect to be related to differences in pupil learning.

Grouping of RAMOS Variables

RAMOS variables, like APPLE variables, were grouped and for the same reason. We could have run the RAMOS variables as a set in a regression analyses because there were 22 such variables which is less

than the number of teachers in the smallest group (N = 33). But we chose to use all observation variables in the regression analyses which meant that each of the original sets had to be reduced in number by combining each set into larger categories. The interested reader will find the partial correlations of the RAMOS scores with the pupil achievement measures in Volume III, Chapter 2.

The same principle was applied in regrouping RAMOS variables as was applied in grouping the APPLE variables. They were grouped to preserve the original dimensions. The frequencies in the original score intervals were small in some cases, so the grouping made the variance of the scores used adequate for analysis. A method to be described later in this chapter was used to provide a new category score. Four variables resulted from the grouping process:

RAMOS 1 (R-1)--Time Spent in Instruction. This category groups together all the Role scores. The majority of the original Role scores are some form of instruction; the others are actions taken to facilitate instruction while instruction is occurring. The combination of these scores represents total instructional time.

RAMOS 2 (R-2)--Variety of Content. This category groups the original Aim scores. Teachers with higher scores in this category covered a greater variety of content. The score is weighted by the practising and reviewing of skills.

RAMOS 3 (R-3)--Variety of Materials. This category groups the original Materials scores. Teachers with higher scores use more materials. It is weighted with the book, workbook, paper and pencil combination.

RAMOS 4 (R-4)--Supervised Independent Seatwork. This category

groups scores on the types of pupil activity. A teacher with higher scores uses more varied activities but the score is weighted with independent seatwork.

These four scores were used in the regression analyses. High scores on all four variables describe a teacher who spends more time instructing, uses more materials, covers a greater variety of content, and uses varied pupil activities but mainly independent seatwork. Thus the variables define how closely a teacher's instructional style approximates the model of direct individual instruction.

WORK DIARY Variables

A set of measures were drawn from the information provided in the Work Diaries and were included among the performance measures. These measures are indirect measures of what the teacher does.

The teachers had filled out the Work Diaries on two occasions during the weeks when they were being observed. The diary asked questions about teaching materials, methods, and objectives. The measures drawn from it produced variables similar to those generated by the observational instruments. An original set of 30 were combined into five categories. The Work Diary instruments and the data pertinent to them are in Chapter 5 of Volume V including the partial correlations of each of the original 30 variables with spring pupil scores.

The Work Diary Scores are:

1. Work Diary - 1 (WD-1): Time Spent Instructing and Preparing for Instruction.
2. Work Diary - 2 (WD-2): Variety of Content Covered
3. Work Diary - 3 (WD-3): Complexity of Conceptualization of Instructional Design
4. Work Diary - 4 (WD-4): Variety of Instructional Contexts Used
5. Work Diary - 5 (WD-5): Variety of Materials Used

The original scores were combined by the method to be described. Chapter 6 describes the components of these scores in terms of their means and standard deviations.

The Methods Used to Combine Variables

The construction of a variable was accomplished in several stages. At the first stage an instance of behavior was recorded as a teacher and his or her pupils were observed in a classroom. These instances were actions of the teachers or pupils. These actions, words and movements, were described in terms of their location and the persons and materials involved. The two systems, APPLE and RAMOS, at this point were different in how the instance was recorded. An APPLE-observer literally described the instance; a RAMOS-observer coded in categories which described the characteristics of the instance. A series of successive recordings of these two kinds provided a description of sequences of actions during the observation period.

An organization of this information was made at the second stage. APPLE-data were first sorted into categories using a lexicon of descriptors. Each teacher and his or her class at this point has been described in terms of a list of categories in which numbers were entered which described either the frequency or duration of the event in each category. There were as many lists of this kind as occasions on which the teacher was observed. At this point both systems have yielded a matrix of numbers by category for each teacher, but each teacher will have more than one matrix, one for each occasion on which the teacher was observed.

At the third stage these data were accumulated across occasions. The following steps were taken with the APPLE data.

1. The number of observations in each category was accumulated across occasions. This number is the sum of the number of times an event occurred. (As an example the counts across all teachers for APPLE Pupil Events is given in Table 10, Chapter 1, Volume III and is reproduced here.)
2. These totals were then summed to obtain the total number of events observed. This grand total reveals differences among classrooms. A low number means that few different events were observed across all occasions of observation.
3. Then the sum for each category was divided by the grand total to produce the score for that category.

Suppose that there were five original categories (the actual number was much larger than five). A matrix for two teachers, one of whom had been observed three times and the other twice, might look like this:

Table 10

Raw Frequency Counts of Pupil Events in
Reading and Mathematics Instruction

Events	Reading			Mathematics		
	Grade 2	Grade 5	Total	Grade 2	Grade 5	Total
+ Academic Performance	160	203	363	13	9	22
+ Attentiveness	143	191	334	102	171	273
+ Direction Following	82	77	159	47	56	103
+ Engagement	528	733	1261	257	523	780
+ Participation	78	43	121	36	28	64
+ Volunteering	56	66	122	56	54	110
+ Work Habits	155	143	299	143	183	326
- Conduct	56	44	100	29	41	70
- Inattention	145	179	324	95	177	272
- Talking	64	115	179	54	105	159
0 Conduct	70	69	139	32	51	83
0 Engagement	61	78	139	32	35	67
0 Inattention	54	57	111	26	47	73
0 Work Habits	79	110	189	61	115	176
+ Oral Reading	241	102	343			
+ Phonic Skills	85	61	146			
+ Reading Comprehension	58	55	113			
+ Number Concepts				293	280	573
- Number Concepts				85	66	151
0 Number Concepts				54	58	112

REPRODUCED FROM VOLUME III, CHAPTER 1

Observed Frequencies of Five
Hypothetical Categories for Two Teachers

	T_1				T_2		
	Day of Observation			Σ_i			Σ_i
Category	1	2	3		1	2	
1	5	4	7	16	10	9	19
2	3	1	2	6	8	7	15
3	6	10	12	28	1	2	3
4	2	3	0	5	5	6	11
5	7	10	5	22	1	2	3
Σ_i				77			51

T_1 differs from T_2 in several ways. The total number of observed events for T_1 is greater (77 to 51), but T_1 was observed a third time. T_2 has larger frequencies in most of the categories where T_1 has smaller frequencies. This difference probably reflects a difference in patterns of performance. Both teachers vary within category from occasion to occasion.

By summarizing from occasion to occasion within category we obtain a number which is an estimate of the teacher's base rate for each category. These numbers are then placed on the same scale by computing the proportion of these category sums to the total number of observed events for each teacher. T_1 and T_2 scores are as follows when these calculations are made:

Category	T_1	T_2
1	.21	.37
2	.08	.29
3	.36	.06
4	.06	.22
5	.29	.06
	1.00	1.00

These scores preserve the pattern of differences between the teachers, and the differences between categories for each teacher. But the numbers reflecting these differences have been adjusted for the differences in total number of observations across teachers.

At this stage the matrix of category-scores for each teacher contained numbers which were the proportion of all observations made within a category to the total number of observations made for each teacher. These scores were used in all subsequent calculations.

The steps to transform the RAMOS-data at the third stage were similar, but not identical. Recall that a RAMOS-observer described an event by checking a category and indicating the duration of that category. A RAMOS-observer, for example, sees that a child is working independently in the reading workbook. The independent work, the instructional material, and the content are noted and the time that the pupil continues in this activity is recorded. Each teacher obtains a score for each such category by summing the number of pupil-minutes across all pupils for each category. Thus the score for "instructional-material: workbook" is the sum of all the minutes in which pupils were observed using the reading workbook.

The steps in accumulating this information were:

1. The "Subject" category was subdivided into categories called codes in which pupil-minutes were recorded. The category, "Subject," for example, was subdivided into "Reading," "Mathematics," and "Business," and seven other categories (or codes). If five pupils spent 20 minutes in "Reading" and ten minutes in "Business," and six pupils spent ten minutes in

"Reading" and 15 minutes in "Business," the total number of minutes in each code is computed as follows:

Reading	5 pupils x 20 minutes =	100 minutes
	6 pupils x 10 minutes =	60 minutes
	Total pupil-minutes in Reading =	160 minutes
Business	5 pupils x 10 minutes =	50 minutes
	6 pupils x 15 minutes =	90 minutes
	Total pupil-minutes in Business =	140 minutes

Total pupil-minutes observed = 160 + 140 = 300 minutes. These minutes were accumulated across different occasions of observation.

2. Then the percentage of minutes in each code was computed; e.g.,

$$\text{Percent minutes in Reading} = \frac{160}{300} \times 100 = 53.33\%$$

$$\text{Percent minutes in Business} = \frac{140}{300} \times 100 = 46.66\%$$

Thus for each code each teacher has a score which represents the percentage of pupil-minutes allotted to the actions in that code.

3. Categories of Aim, Activity and Materials were subdivisions of the "subject" category. Pupil-minutes had been recorded for these subcategories. These numbers of minutes were computed as percentages of minutes allotted to the category; for example, if 160 minutes had been allotted to "Reading," and if of this total, 40 minutes had been allotted to introducing new concepts, the category (or code), "introducing new concepts," would have a score = $\frac{140}{160} \times 100 = 25\%$. Each code score is the percentage of pupil time in a subject which was

used in that code; in terms of the example, 25% of pupils' time in Reading was allotted to an event called, "introducing a new concept."

Thus each teacher score is a percentage score. It represents the percentage of time allotted to a particular activity within a particular subject.

Compare APPLE AND RAMOS scores. The APPLE-scores are always less than one (or less than 100). Each score is a percentage score. The percentage is the ratio of the frequency of the event observed to all the events observed within a subject. RAMOS-scores are also percentage scores but the metric is units of time rather than frequency of occurrence. The percentage is of total pupil-minutes allotted to a subcategory within the category of subject. The APPLE scores add up to one or 100%; the RAMOS scores add to 100% only within a category. Both scores are percentages of events within a subject.

Both systems preserve the patterns of differences among teachers. A larger numerical value for a score in either system means that a teacher engaged in that activity more frequently or spent more time in it.[10]

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[10] The many details of the methods used and their rationales are presented in Volume III, Chapters 1 and 2. These chapters contain detailed descriptions of the observational systems, intercorrelations among variables, and the partial correlations of each descriptor with pupil test scores. In this volume, Volume 1, these descriptors were organized into clusters, and these clusters were used as the measures of teaching performances in the analyses presented in this volume. The procedures for grouping the original variables into clusters are described in the following pages.

Grouping of Variables

Both of these systems produced, through the steps described above, more variables than there were teachers. The correlation matrix for the sets of variables also showed considerable intercorrelation. Another important characteristic of the data is that the scores were not equally distributed across all descriptors in similar ways.

Consider these data drawn from the APPLE-observations. Four descriptors of teacher reactions are listed in the left-hand column. The mean ($\bar{X}$) and standard deviation (SD) of these observations are listed in the columns to the right. These numbers were calculated by summing across all teachers who taught second-grade reading. The scores used in these calculations were those described previously.

Grade 2 Reading (N = 41)

Descriptor	$\bar{X}$	SD	$\bar{X}$/SD	SD/$\bar{X}$
Ignoring	2.04	3.30	.62	1.62
Negative Feedback	.47	1.34	.35	2.85
No Response	62.12	17.34	3.58	.28
Moves On	1.26	2.14	0.59	1.70

As can be seen, the means differ considerably. The original proportions have been converted to percentages so that a number like 2.04 for Ignoring is interpreted as follows:

1. Each teacher's percentage in this category is an X_{ij}.
2. The mean of these X_i is $\frac{\Sigma X_i}{n}$, (i = 1...n).
3. Therefore, across all teachers, the average percentage frequency of the teacher response, Ignoring, is 2%.

4. Since the standard deviation (SD) is 3.3, if these responses were randomly distributed across teachers, approximately two-thirds of the Ignoring scores would fall between 2 $\pm$ 3.3.
5. But obviously, the scores are not randomly distributed. The distribution is skewed to the right which means that most teachers did not ignore a pupil response.

The last two columns to the right give numbers which represent differences in the characteristics of the distributions. The ratio $\bar{X}/SD$ gives the size of the unit deviation in percentage scores; that is, if the scores were standardized ($\bar{X} = 0$, $SD = 1$), the equivalent size in percentage scores of the unit deviation is given by $\bar{X}/SD$.

The ratio $SD/\bar{X}$ is the Coefficient of Variation (V) and is a measure of the spread of the distributions. Note that No Response has a larger standard deviation than Ignoring. But the Coefficients of Variation for each descriptor tells us that there is a much larger spread in the Ignoring scores than in the No Response scores.

These data indicate that No Response is the most common response in this set. A few teachers make the other responses and some make more than the mean number. But the distributions of these other responses are skewed, with most teachers making few or none of these responses.

Consider the following data for another set of descriptors

Grade 2 Reading (N = 41)

Descriptor	$\bar{X}$	SD	$\bar{X}$/SD	SD/$\bar{X}$
Instructing	4.04	4.36	0.93	1.08
Questioning	2.46	1.73	1.42	0.70
Positive Feedback	7.05	5.93	1.19	0.84
Praise	3.15	3.81	0.83	1.21
Teacher Help	2.32	2.07	1.12	0.89
Recognizing	1.66	2.00	0.83	1.20

Each descriptor is a positive response to a pupil, ranging from recognizing a pupil, for example, when she raises her hand or he asks a question, to giving instruction. Note that the means ($\bar{X}$) are relatively small. A reader who is surprised by small percentages should recall that each percentage is calculated from a ratio of the number of observations in that category to all the observations. Teachers were observed doing many different things, and it is not surprising that the percentages for each category are small. Large percentages are obviously interesting.

A reasonable conclusion is that these descriptors are distributed quite differently across teachers. But are the descriptors within these categories related to each other? The intercorrelations among them are below:

Correlations (r) Among Unresponsiveness Descriptors
Grade 2 Reading (N = 33)

	IG	NF	NR	MO
Ignoring (IG)	1.00			
Negative Feedback (NF)	- .04	1.00		
No Response (NR)	- .17	- .02	1.00	
Moves On (MO)	.09	- .04	- .15	1.00

Correlations (r) Among Responsiveness Descriptors (N = 33)

	I	Q	PF	P	TH	R
Instructing (I)	1.00					
Questioning (Q)	- .05	1.00				
Positive Feedback (PF)	.19	.04	1.00			
Praise (P)	.00	.15	.00	1.00		
Teacher Help (TH)	- .07	- .18	- .02	.21	1.00	
Recognizing (R)	- .10	.22	.12	.02	- .14	1.00

The nonresponsive descriptors are obviously not related but given the range in scores, small r's are not surprising. The categories of positive responses are also largely unrelated. There may be some association between Instructing and Positive Feedback; but both distributions are skewed to the right; a similar association of the same magnitude appears between Teacher Help and Praise. But note the zero correlation between Praise and Positive Feedback, and the practically zero correlation (r = -.07) between Teacher Help and Instructing. A reasonable hunch is that there are two performance patterns in the scores; one an Instructing-Positive Feedback pattern and the other a Teacher Help-Praise pattern.

Compare now the descriptors in each category using the matrix of correlations provided below:

Correlations Among Descriptors of
Teacher Responsiveness and Nonresponsiveness

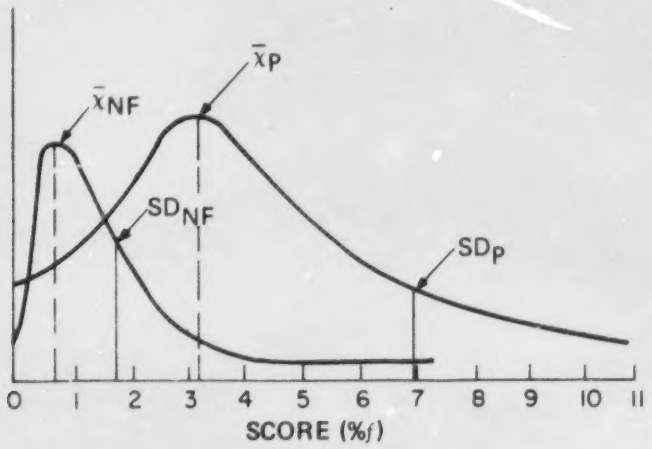
Grade 2 Reading (N = 33)

	IG	NF	NR	MO
I	-.12	.14	-.18	-.02
Q	-.02	.06	-.27	.44
PF	-.13	-.01	-.23	.12
P	-.03	-.22	-.20	-.28
TH	.18	-.13	-.06	-.06
R	-.01	-.06	.01	.26

There are some interesting associations in this matrix. Note that Moves On (MO) is positively correlated with Questioning (r = .44) and Recognizing (r = .26), but negatively related to Praise (r = -.28). No Response is negatively related to Instructing (r = -.18), Questioning (r = -.27), Positive Feedback (r = -.23), and Praise (r = -.20). Again there appear to be two independent patterns of performance in the data.

Some relations are as expected; Positive Feedback and Praise are negatively correlated with the nonresponsiveness descriptors. Negative Feedback is negatively correlated (r = -.22) with Praise. But this relation illustrates an important fact. The mean frequency of both descriptors is low (Negative Feedback: $\bar{X}$ = .47; Praise: $\bar{X}$ = 3.15) and their Coefficients of Variation are greater than one

(Negative Feedback: V = 3.00; Praise: V = 1.2095). The two distributions when plotted look something like the following:



There are relatively few high scores in either distribution; but there is a much larger number of low scores.

What is apparent in the original data is that these descriptors appear in different patterns in teachers' performances. It was also obvious from an analysis of the cross-tabulations that different patterns of performances are nested within instructional contexts which differ in terms of the teachers' relative effectiveness (see Volume 3, Chapter 1, Tables 66-85). A teacher, for example, who frequently teaches the class as a group, and whose instruction is more effective as measured by residual scores, more frequently asks questions, does more checking, discussing and explaining, does more listening; whereas a teacher who is less effective does more organizing

and less instruction (see Volume 3, Chapter 1, Table 66). The more and less effective teachers also differ in the frequencies with which they use different instructional contexts.

Factor analysis is frequently used to identify such variations in patterns. The APPLE-data were factored (see Volume 3, Chapter 1, Appendix C). When this was done, different factors emerged by grade and by subject. Teachers will not find such a result surprising, but it is inconsistent with a widespread belief among researchers that a common set of teaching skills, usually called "generic" skills, are the core of effective teaching.

At this point a choice of how to group the descriptors was necessary. We could have used the factor scores. We decided against doing this for several reasons. First, the number of teachers whose scores are used in the factor analysis is relatively small whereas the number of variables in the correlation matrix is large (for Grade 2 Reading, there were 33 teachers, and the correlation matrix of APPLE-variables is 50 x 50). Therefore, the reliability of the factors would be suspect. Second, we knew that different factors emerged by grade and subject, but this result might be discounted because of the ratio of variables to teachers.

A third, and the most important reason, is that for the purposes of this study it is better to preserve all of the data as close to its original form as possible. At this stage in the research program of the Beginning Teacher Evaluation Study the goal is to find teaching performances significantly related to pupil learning which will be

studied further in later phases. Therefore, we decided not to use the results of the factor analyses because the factor scores would not contain all of the original data. As the analyses presented in Volume 3, Chapter 1, Appendix C make clear, finding a structure in the original data is complicated technically and conceptually.

The problem of having more variables than teachers remained, however. We devised the procedure described in the next section to generate scores for the new superordinate categories.

Score Transformations

The goal of the process described here is to combine the original scores by a linear transformation so that the relations among the original scores are preserved in the combinatorial process. Suppose that we had N teachers each with three scores, X_1, X_2 and X_3. These are to be combined so that

$$Z_1 = \text{std } (Y_1) = \text{std } (X_1 + X_2)$$
$$Z_2 = \text{std } (Y_2) = \text{std } (X_3)$$

i.e., each teacher will have two new scores which are standard scores. Z_1 is the standardized sum of X_1 and X_2. The correlation matrix of the original scores is

$$C = \begin{vmatrix} 1 & c_{12} & c_{13} \\ c_{21} & 1 & c_{23} \\ c_{31} & c_{32} & 1 \end{vmatrix}$$

where c_{21} is r_{21}, that is the correlation between X_1 and X_2.

For simplicity, let us use $a = c_{21}$, $b = c_{31}$ and $d = c_{23}$; then

$$C = \begin{vmatrix} 1 & a & b \\ a & 1 & d \\ b & d & 1 \end{vmatrix}$$

where a, b, and d are the r's among X_1, X_2 and X_3.

A transformation matrix T is formed as follows

$$T = \begin{vmatrix} 1 & 0 \\ 1 & 0 \\ 0 & 1 \end{vmatrix}$$

Its transpose T' is

$$T' = \begin{vmatrix} 1 & 1 & 0 \\ 0 & 0 & 1 \end{vmatrix}$$

Then the linear transformation of C yields a new correlation matrix, A, where

$$A = T' \; C \; T$$

or

$$A = \begin{vmatrix} 1 & 1 & 0 \\ 0 & 0 & 1 \end{vmatrix} \cdot \begin{vmatrix} 1 & a & b \\ a & 1 & d \\ b & d & 1 \end{vmatrix} \cdot \begin{vmatrix} 1 & 0 \\ 1 & 0 \\ 0 & 1 \end{vmatrix}$$

or

$$A = \begin{vmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{vmatrix}$$

where a_{ij} represent the correlations among the two new scores, Y_1 and Y_2.

The step in which the original matrix, C, is multiplied by T and T' is the way in which the scores are combined into the new scores. The matrix, A, is the matrix of correlations of the combined scores.

$$A = \begin{vmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{vmatrix}$$

Then this matrix is standardized to give a third matrix, $\hat{C}$ where

$$\hat{C} = \text{std } (A)$$

or

$$\hat{C} = \begin{vmatrix} 1 & \hat{c}_{12} \\ \hat{c}_{21} & 1 \end{vmatrix}$$

where

$$\hat{c}_{ij} = \frac{a_{ij}}{\sqrt{a_{ii}}\ \sqrt{a_{jj}}}$$

In standardizing, the variances of the original scores were used.

The above series of steps produces a linear transformation of the original scores. The correlation matrix is used because its transformation, $\hat{C}$, is used in the regression analyses.

The Correlations Among the Grouped Variables

Table 4.2 presents the correlations among the grouped variables for second-grade reading. It is given here for illustrative purposes. All the correlation matrices for the ungrouped and grouped variables are in Appendices A and B of this volume.

The reader should be alert to the differences in the correlations by grade and subject. These differences are sufficient evidence that the patterns of teaching differ by grade and subject.

Table 4.2

Intercorrelation Matrix of Teaching Performance Variables for Grade 2 Reading (N = 40)

BTES - FINAL STRUCTURAL ANALYSIS - GRADE 2 READING

CORRELATIONS

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	WD-----1	WD-----2	WD-----3	WD-----4	WD-----5	RAMOS--1	RAMOS--2	RAMOS--3	RAMOS--4	APPLE--1
WD-----1	1.0000	0.0173	0.1091	0.1686	0.1905	0.0187	-0.0015	-0.0965	0.0971	-0.1299
WD-----2	0.0173	1.0000	-0.0194	0.2949	0.1898	0.1636	0.2808	0.0241	0.0506	-0.1018
WD-----3	0.1091	-0.0194	1.0000	0.0351	0.4115	0.1860	0.0660	0.1331	0.1717	0.1309
WD-----4	0.1686	0.2949	0.0351	1.0000	0.2040	0.2617	0.1442	-0.1131	-0.0730	-0.1276
WD-----5	0.1905	0.1898	0.4115	0.2040	1.0000	0.3041	0.0443	-0.0216	-0.0429	-0.4044
RAMOS--1	0.0187	0.1636	0.1860	0.2617	0.3041	1.0000	0.6280	0.3499	0.2229	0.0720
RAMOS--2	-0.0015	0.2808	0.0660	0.1442	0.0443	0.6280	1.0000	0.6143	0.5221	-0.2339
RAMOS--3	-0.0965	0.0241	0.1331	-0.1131	-0.0216	0.3499	0.6143	1.0000	0.6919	0.0859
RAMOS--4	0.0971	0.0506	0.1717	-0.0730	-0.0429	0.2229	0.5221	0.6919	1.0000	-0.2373
APPLE--1	-0.1299	-0.1018	0.1309	-0.1276	-0.2113	-0.3808	-0.1401	-0.0390	0.0039	-0.0313
APPLE--2	0.0558	-0.1004	-0.1276	-0.4044	0.1945	0.2160	0.0373	0.0042	-0.0448	1.0000
APPLE--3	0.0183	0.0345	-0.4044	0.0720	-0.3651	0.0863	0.2611	0.2621	0.0587	-0.4010
APPLE--5	0.0083	-0.0369	0.0720	-0.2339	-0.0025	0.3332	0.0952	0.0706	-0.1346	0.0377
APPLE--6	-0.2992	-0.1259	-0.2339	0.0859	-0.2344	-0.1578	-0.0542	0.1790	0.0644	-0.2043
APPLE--7	0.1717	0.1853	0.0859	-0.2373	0.0992	-0.0765	0.1350	0.1391	0.2564	0.3693
APPLE--8	-0.2629	0.0043	-0.2373	-0.0313	-0.2359	0.0905	0.2507	0.0086	0.0327	0.1493
APPLE--9	-0.2759	0.1000	-0.0313	0.0149	-0.0045	0.0456	0.1805	0.1975	0.0963	-0.0643
APPLE-10	0.1899	-0.0382	0.0149	-0.2289	-0.0026	-0.0830	0.1634	0.1043	0.0700	0.1659
APPLE-11	0.4572	-0.0136	-0.2289	0.0863	-0.2137	0.0033	-0.0131	-0.0567	-0.0815	0.3014
APPLE-12	-0.1842	-0.3028	0.0863	0.0414	0.0294	-0.2235	-0.0740	0.2494	-0.0194	-0.0677
APPLE-13	0.1537	0.3979	0.0414	-0.1211	0.4751	0.0286	0.0981	0.1328	0.1107	0.2915
APPLE-14	0.0464	-0.1207	-0.1211	-0.0017	-0.2830	-0.0764	-0.0744	-0.0666	0.0557	-0.0150
CAT RCMP	-0.1571	-0.0770	-0.0017	0.0913	0.0895	-0.2524	-0.3642	0.0430	-0.1696	0.1321
READ APP	-0.0422	0.1225	0.0913	0.0707	-0.1589	-0.1140	0.0088	0.3035	0.2149	0.0749
DECODING	0.1051	-0.0976	0.0707	-0.0632	-0.2507	-0.2414	-0.0418	0.2972	0.3233	0.1428
READ ACH	-0.0365	0.0482	-0.0632	0.0769	0.1445	-0.1054	-0.0830	-0.0027	0.1086	0.3598
TGT READ	-0.0711	0.0592	0.0827	0.0935	-0.0141	-0.1901	-0.1626	0.1925	0.0987	0.0937
				-0.2671						0.2244

Table 4.2 (continued)

BTES - FINAL STRUCTURAL ANALYSIS - GRADE 2 READING 14:52:19 5/22/75 PAGE 4

CORRELATIONS

	APPLE--2	APPLE--3	APPLE--5	APPLE--6	APPLE--7	APPLE--8	APPLE--9	APPLE-10	APPLE-11	APPLE-12
WD-----1	0.0558	0.0183	0.0083	-0.2992	0.1717	-0.2629	-0.2759	0.1899	0.4572	-0.1842
WD-----2	-0.1004	0.0345	-0.0269	-0.1259	0.1853	0.0043	0.1000	-0.0382	-0.0136	-0.3026
WD-----3	-0.1276	-0.4044	0.0720	-0.2339	0.0859	-0.2373	-0.0313	0.0149	-0.2289	0.0803
WD-----4	0.2515	-0.1741	-0.1242	-0.4403	0.3912	0.0957	-0.1419	-0.1336	0.3780	-0.3891
WD-----5	0.1945	-0.3657	-0.0025	-0.2344	0.0992	-0.2359	-0.0045	-0.0026	-0.2137	0.0494
RAMUS--1	0.2160	0.0863	0.3332	-0.1578	-0.0765	0.0965	0.0456	-0.0830	0.0033	-0.2235
RAMUS--2	0.0373	0.2611	0.0952	-0.0942	0.1350	0.2507	0.1805	0.1634	-0.0131	-0.0740
RAMUS--3	0.0042	0.2621	0.0706	0.1790	0.1391	0.0086	0.1975	0.1043	-0.0507	0.2479
RAMUS--4	-0.0448	0.0587	-0.1346	0.0044	0.2564	0.0327	0.0963	0.0700	-0.0615	-0.0174
APPLE--1	-0.4010	0.0377	-0.2843	0.3693	0.1400	-0.0040	0.1069	0.3044	-0.0677	0.2515
APPLE--2	1.0000	-0.2854	0.2213	-0.1827	0.0426	0.1699	-0.1712	-0.2491	0.1864	-0.2431
APPLE--3	-0.2854	1.0000	0.1755	0.3498	-0.0974	0.2231	0.4899	0.3872	0.0421	0.3017
APPLE--5	0.2213	0.1755	1.0000	-0.0659	-0.2501	-0.0211	-0.0961	-0.0734	-0.0626	-0.0609
APPLE--6	-0.1827	0.3498	-0.0659	1.0000	-0.3615	0.0157	0.1153	0.2976	-0.3116	0.3239
APPLE--7	0.0426	-0.0974	-0.2501	-0.3615	1.0000	0.2047	-0.0432	-0.1091	0.3270	-0.0776
APPLE--8	0.1699	0.2231	-0.0211	0.0157	0.2047	1.0000	0.2905	0.0296	0.0912	-0.1267
APPLE--9	-0.1712	0.4899	-0.0961	0.1153	-0.0432	0.2905	1.0000	0.3065	-0.1919	0.1319
APPLE-10	-0.2491	0.3872	-0.0734	0.2976	-0.1091	0.0296	0.3065	1.0000	-0.0292	0.3414
APPLE-11	0.1864	0.0421	-0.0626	-0.3116	0.3270	0.0912	-0.1919	-0.0292	1.0000	-0.2147
APPLE-12	-0.2431	0.3017	-0.0609	0.3239	-0.0776	-0.1267	0.1319	0.3414	-0.2147	1.0000
APPLE-13	0.2709	0.0132	-0.0859	-0.1305	0.0374	0.1572	0.0810	0.0798	0.0950	0.0909
APPLE-14	0.3235	0.0096	-0.0165	0.0475	0.0824	0.2493	0.1561	0.2195	0.1402	-0.1819
CAT RCMP	-0.2143	-0.0424	0.1597	0.2063	0.0542	-0.3136	-0.1467	-0.0642	0.0112	0.0915
READ APP	-0.1382	0.0829	-0.0723	0.0933	0.1113	-0.0440	0.0466	-0.1030	-0.1007	0.1612
DECODING	-0.2139	0.1057	-0.1144	-0.0143	0.4644	0.0974	0.0785	0.1268	0.1314	0.2786
READ ACH	-0.1173	-0.1344	-0.0256	-0.0185	0.0712	-0.0894	0.1728	0.0362	-0.0436	0.0590
TOT READ	-0.2446	-0.0073	0.0177	-0.2182	0.1091	-0.1468	0.0077	-0.0658	-0.0631	0.2032

Table 4.2 (continued)

BTES - FINAL STRUCTURAL ANALYSIS - GRADE 2 READING 14:52:19 5/22/75 PAGE 12

CORRELATIONS

	APPLE-13	APPLE-14	CAT RCMP	READ APP	DECODING	READ ACH	TOT READ
WD-----1	0.1537	0.0484	-0.1571	-0.0422	0.1051	-0.0365	-0.0711
WD-----2	0.3979	-0.1207	-0.0770	0.1225	-0.0976	0.0482	0.0592
WD-----3	0.0414	-0.1211	-0.0017	0.0913	0.0707	-0.0632	0.0627
WD-----4	0.2009	-0.0202	-0.0609	-0.2473	0.0769	0.0935	-0.2671
WD-----5	0.2751	-0.2630	0.0895	-0.1589	-0.2507	0.1445	-0.0141
RAMOS--1	0.0286	-0.0764	-0.2524	-0.1140	-0.2414	-0.1054	-0.1931
RAMOS--2	0.0981	-0.0744	-0.3642	0.0088	-0.0418	-0.0830	-0.1626
RAMOS--3	0.1328	-0.0868	0.0430	0.3035	0.2472	-0.0027	0.1542
RAMOS--4	0.1107	0.0957	-0.1696	0.2149	0.3233	0.1086	0.0967
APPLE--1	-0.0150	0.1391	0.0749	0.1428	0.3599	0.0937	0.2249
APPLE--2	0.2709	0.3235	-0.2143	-0.1382	-0.2139	-0.1173	-0.2448
APPLE--3	0.0132	0.0096	-0.0424	0.0829	0.1057	-0.1344	-0.0073
APPLE--5	-0.0859	-0.0165	0.1597	-0.0723	-0.1144	-0.0256	0.0177
APPLE--6	-0.1305	0.0475	0.2063	0.0933	-0.0143	-0.0165	0.2102
APPLE--7	0.6374	0.0824	0.0342	0.1113	0.4044	0.0712	0.1074
APPLE--8	0.1572	0.2493	-0.3136	-0.0440	0.0974	-0.0894	-0.1408
APPLE--9	0.0810	0.1561	-0.1407	0.0466	0.0765	0.1728	0.0077
APPLE-10	0.0798	0.2195	-0.0642	-0.1630	0.1268	0.0362	-0.0658
APPLE-11	0.0950	0.1402	0.0112	-0.1007	0.1514	-0.0436	-0.0031
APPLE-12	0.0969	-0.1619	0.0915	0.1612	0.2786	0.0590	0.2032
APPLE-13	1.0000	0.0906	-0.1043	0.0482	0.1489	-0.1677	-0.0110
APPLE-14	0.0906	1.0000	-0.1566	-0.0109	0.1012	0.0901	-0.0530
CAT RCMP	-0.1043	-0.1566	1.0000	0.0965	0.1928	0.1516	0.4781
READ APP	0.0482	-0.0109	0.0965	1.0000	0.4431	0.4352	0.8363
DECODING	0.1489	0.1012	0.1928	0.4431	1.0000	0.4672	0.4339
READ ACH	-0.1677	0.0901	0.1516	0.4352	0.4672	1.0000	0.6372
TOT READ	-0.0110	-0.0530	0.4781	0.8363	0.4339	0.6372	1.0000

The Management of the Observation System

A master schedule of observation days was made up in the project office in Berkeley. Recall that teachers had asked to be observed on Tuesday, Wednesday and Thursday. Each school's schedule was obtained to locate holidays or other unusual events that would change the regular program. These days were eliminated from the set of possible days of observation.

The set of possible days included all those on which there were no planned interruptions of the daily schedule, were Tuesdays, Wednesdays and Thursdays, and fell in the period of February to the middle of May. Observers were randomly assigned to these days of observation.

When the schedule had been prepared, each teacher was written and informed of the days on which she or he would be observed, and were asked to notify ETS Berkeley if for some reason those days would be inconvenient. The teachers were also called to confirm their schedules and were asked to notify us if for some reason the observation day should be changed.

Recall that there was a northern and southern group for each observation system. Assignment was made by area. The exception to random assignment of observers to teachers occurred for the observations in Barstow which is located at the eastern border of the state and the route to which is through desert-like country. Observers were assigned to Barstow who could make it there conveniently.

The observation schedule was held to rigidly. Exceptions to the original schedule inevitably occurred because teachers were ill, or a field-trip had been scheduled, or similar reasons. The observer always called in advance to remind the teacher of the observation day. But when uncontrollable factors interfered with meeting the regularly scheduled day, the day was rescheduled.

In some few cases, a scheduled observer had to be replaced. The "gas crisis" occurred shortly after the observations began, and an observer who had no transportation had to be replaced. An observer who could make the scheduled observation on short notice was the replacement. An examination of the deviations from the original schedule showed no pattern that would lead one to suspect bias in the assignment of observers to observation days or teachers; for example, one or a few observers did not cover most or a substantial number of the observations.

The number of observations per teacher was systematically varied in order to study the reliability of the observation system and to compare the two instruments which were to be used. A subsample of 25 teachers was randomly selected to be observed eight times each, four by an APPLE observer and four by a RAMOS observer. Two each of these were done in the February-March period and two each in April-May.

The other 72 teachers were observed three times, once each by an APPLE and a RAMOS observer simultaneously. Thirty-six of these teachers were observed a second time by an APPLE observer, and the other 36, a second time by a RAMOS observer.

All scheduling was done by Patricia Wheeler, Associate Project Director. All modifications necessitated by uncontrollable events were made by her. A complete report on the management of the system is in Volume II.

An observation was logged as completed when the APPLE forms had arrived at ETS Berkeley and RAMOS forms at Stanford. All observations except one were completed--the observer arrived to find that the morning was to be devoted to making pancakes. The set of observational data represents 400 days of observation of 95 teachers in 43 schools in northern and southern California. These are the data subsumed into the 22 teaching performance variables used in the regression analyses.

The Reliabilities of the Observation System

An observation system includes both the instruments that were used and the method of gathering the data. The method of gathering the data includes the frequency of collecting it, the characteristics of the occasions on which it was collected and the conditions under which it was collected. Variations in instruments and occasions are sources of variation in the data. It will be useful to consider the nature of the problems involved in estimating the sources and amounts of variation in a set of data of the kind obtained in this study.

The Problem

The plural of "reliability" is used somewhat loosely to call attention to the problem of the "reliability" of the observation

system. The reliability coefficients for observation systems are estimates of the errors of measurement in estimating the mean values of the behaviors represented in the category scores which describe the behavior. The accuracy of these means needs to be known to estimate the meaning of results obtained in regression analyses and analyses of variance.

Each score for a category is a sample estimate of the mean for that category. The usual practice is to average these estimates across occasions to estimate the universe value. These estimates of the mean values are usually based on only a few samples. A teacher may be seen once, twice, three or more times from which a description of the teacher's behavior is generated in terms of scores. These scores are estimates of the universe mean. In most studies the number of occasions of observation is relatively few.

Most investigators attempt to make this sample by occasion as reliable as possible. It is usually assumed that if two observers viewing the same situation substantially agree on what they say, the estimates by occasion will be accurate. But there are other sources of variance across occasions and within occasions. At best the percent agreement between two or more observers on the same occasion is an estimate of the accuracy with which the observers are using the instrument. The observers have been trained to code and to note certain events. When two of them code in a highly similar manner on a common occasion the most sensible

interpretation of the correlation between their "observations" is that they noted the same stimuli and labelled them the same way.

That such a measure is a very weak estimate of reliability has long since been pointed out (Medley & Mitzel, 1963; see also, Cronbach, 1972, pp. 189-193). As Medley and Mitzel note, high agreement between two observers can be obtained if the events they observe are concrete and readily recognizable; for example, the number of desks in the room. But even estimates of such concrete observables may be poor estimates of the mean of the variable if these observables change from day to day. The number of pupils taught by a teacher, for example, is easy to count and the amount of disagreement between two observers on one occasion will usually be very low. But if the number of pupils changes from day to day, as it may in open classrooms or multi-grade schools, the estimate of the number taught made on one occasion will be different from that made on a second occasion. If the two observers repeatedly note the number of pupils on many different occasions, the estimate of the mean number of pupils taught is likely to be more accurate. But in the typical case, having once established that the observers can agree on one occasion, for reasons of economy and to obtain a larger sample of observations, the observers are assigned to different teachers on different occasions. We know that each observer is probably producing similar kinds of data on each occasion, but how accurately is the mean of the events being observed estimated?

These scores portray the differences among teachers. The question is, are these differences a reliable estimate of the "true" differences among the teachers or have the differences arisen from sampling error. But there is no single estimate of this sampling error. It may be thought of as a sum of estimates of error produced by different sources.

The observation samples facets of events on each occasion. There will be variation on these facets. This variation is a mixture of sampling error and instrument error, and the former is the troublesome problem in the observation of events like teaching.

Instrument error relates to the sensitivity of the instrument for detecting differences and the standardization of the procedure for its use. A blood-pressure gauge is sensitive to variations in blood pressure, but errors can be made in adjusting and reading the gauge which will affect the readings. The procedure for taking blood pressure is therefore carefully controlled. If the instrument were relatively insensitive, estimates of blood pressure would not be reliable, a fact which would be reflected in the confidence intervals for a set of readings.

Sampling error in this case refers to sources of variation in the event itself. It is well known that blood pressure fluctuates, even within relatively short periods of time. But enough is known about these variations so that doctors and nurses can interpret readings.

The problem for interpretation is to estimate the significance of "outliers," readings that depart markedly from the estimates of the population mean derived from measures on a large number of people. Thus, knowing the sources of variation associated with blood pressure readings and having reliable estimates of the population mean enable a doctor or nurse to interpret the significance of high or low blood pressure readings. Readings at the extremes of the distribution are frequently checked by a second observer or the patient is allowed to rest before a second reading or repeated measurements are made over several days. Thus, a reliable judgment about a patient's blood pressure can be made from one or a few observations.

The case in the observation of teaching is unfortunately made problematic by the lack of data readily available to the reader of blood pressures. We have very poor estimates of the sources of variation in teaching behavior. We also have no real estimates of population values. Comparatively few teachers have been observed; the samples of teachers differ in obvious ways; and to make matters worse there is relatively little overlap in what has been observed. The practical consequence is that if we observe a teacher using independent seatwork on the occasions that we observe him or her, we do not have base-line data available to judge if the teacher is an "outlier." We may make two or more observations, but in the absence of knowledge about the sources of variation affecting the observation, we do not know how many additional observations to make.

The problem of estimating reliability is to estimate the accuracy of the mean values of the observed events. The accuracy of this estimate depends on what is being observed, how much that event changes from occasion to occasion, how observers change from occasion to occasion and how much they differ from each other. Frequently these sources of variance are confounded in a study. We attempted by the design of this study and by analysis to unscramble some of these sources of variation.

Sources of Variation in Teacher Observations

The state of the art in the observation of teaching behavior is so primitive that we know very little about the sources of variation in teacher behavior. Common sense assumptions need to be made. On this basis we expect the major source of variance in a set of observations to be teachers, occasions, subjects taught, observers, instruments and pupils. Of these, variance across teachers is no problem since the relation of this variance to variance in pupil achievement is the object of study. The problem is to estimate the extent to which this variance is a function of the variance in the other factors.

There is evidence that occasions and situations are likely to be large sources of variance. Cronbach's (1972) reanalysis of the Medley and Mitzel data as well as their original analysis indicate that the problem is variation by occasion and situation. These two terms mean different days of observation (occasion) and different contexts within days (situations). Cronbach's analysis

separated out the within-teacher variance from the teacher x occasion interaction variance. But both analyses lead to the same conclusion, the number of occasions of observation of teachers should be as large as possible. Few occasions lead to underestimates of the within-teacher variance. In this study we tried to resolve this problem by increasing the number of occasions of observation for a subsample of teachers (N = 25).

Probably a large source of variance is that associated with pupils. This source is critical in this study because all observations are linked to pupils. Teacher behaviors are recorded only in conjunction with a specified pupil event.

Analysis of the BTES Observations

The first step in analyzing the observational data was to cumulate the frequencies of the original codes. These analyses revealed a number of markedly skewed distributions. Some behaviors occur infrequently. "Games", for example, is rarely seen. Events of low frequency of this kind may be poorly estimated because seeing them is likely to be highly dependent on the occasion of observation. They are seen if the observer is there to see them. But teachers with high scores in such codes are more likely to be teachers who use games more frequently; that is, if two observers on two different occasions see a teacher using games, the probability is that this teacher uses games more frequently in instruction. Teachers who use games less frequently may receive zero scores on a particular occasion of observation, thus

their scores will be on the low side of their mean but they will be appropriately placed relative to other teachers. Some distributions are so skewed that it is obvious that the assumptions of the analysis of variance methods are not met.

The other obvious feature of the data was the great variation in the frequencies across categories or codes. Teaching contexts were recorded in numbers ten times as large as some teaching activities. This relation may seem surprising until it is remembered that the setting for the pupil may change several times in the course of a lesson, whereas the teacher continues to use the same kinds of teaching activities across contexts--he or she questions, reinforces, discusses, explains and so forth whether the pupil is working alone, in a group or in the class as-a-whole.

A teacher's score is estimated from the number of such observations. A teacher therefore has a high score on AP-7 (teaching the class as-a-whole) because there are a number of such events recorded for him or her for each day on which the teacher was observed. But it does not follow that this teacher might not teach differently on other days. It is, however, a reasonable inference that such a teacher will be near the high end of the frequency distribution of AP-7 scores if on two or more occasions AP-7 is recorded more frequently than other contexts.

The data have been aggregated into larger categories for the analyses presented in this volume. The procedure for combining the original codes was used because of the character of the distributions, because the absolute frequencies differed across

categories, and because there were more codes than teachers. Events were combined into categories in such a way that their variances were taken into account. Thus, within a category such as AP-10 (developing pupils understanding) are all events involving longer sustained instructional interactions with pupils. These are summed, each subcategory score being standardized with its own variance. The combining process preserves the pattern of inter-correlations among the variables. Thus, these categories are based on a larger number of event-observations than the original scores.

It should also be remembered that scores for codes are relative frequencies or percentage of total time. These numbers would be inaccurate estimates of mean values only if teachers taught in markedly different ways on the occasions when observers were not present. We do know there is a variability by occasion but we do not think this variability was such that the estimates of the relative frequency of performances is highly inaccurate.

We have tried several components of variance analyses with the original codes. These analyses show teacher by occasion differences. This component's coefficient tells us that teachers are variable across occasions, and the contribution of observers to this difference cannot be estimated accurately except by analyzing the data in its original unaggregated form.

To estimate the component for observers accurately we would have to estimate the component of variance due to pupils. Recall that the observers focussed on particular pupils. A teacher event is in reality a pupil event in which the teacher is parti-

cipating. The pupils observed had been randomly selected from a matrix into which they had been sorted by their achievement and their teacher's expectations for their achievement. There will be variance in the pupil events associated with these characteristics. There will also be variance across pupils in what they are doing.

In the analysis performed with the original codes, the component of variance for pupils is pooled into the error term. Thus, the error term is large with respect to the other terms used in estimating coefficients. This error term contains all variations by observer by event by pupil by specific time of observation.

To understand this source of variation consider how the observations were made. An observer noted the start time after selecting one of the target students to observe. The observer then recorded pupil events until the context changed. Thus, there will be variability in the number and kind of events recorded for each pupil and in the length of observation time of the pupil. The observer by pupil interaction is also a source of variance.

The data are available to estimate these sources of variance. To make this analysis, however, each original event must be sorted by pupil, by observer and by time, all within occasion. Once this sort is made, the data may be then sorted by day and by subject and even by topic within subject. It was impossible for us within the time constraints of this project to carry out this analysis for both observation systems. There were, for example, about 20,000 APPLE event forms, each with several observations recorded on it. The data are, however, recorded and stored so that the comprehensive analysis required can be done.

Our design nested observers with occasions. Analyses of the components of variance by teachers, by occasions and by observers showed differences by all three components for some categories. In this analysis, however, all interaction terms are pooled either into a component or the residual. We take the by occasions differences in these data more seriously. But the components of variance model used was too primitive for estimating all the sources of variance.

Several precautions were taken to control for sources of variance in the data that may be unrelated to differences among the teachers. Teachers were observed on Tuesday through Thursday at their request because they thought Mondays and Fridays were likely to be atypical days. Teachers were also called in advance to make sure that the coming observation would not be made on days when unusual activities were planned.

Regression analyses of the data have been done by subject and grade. Thus differences among teachers in how they teach a subject or children of a grade are not confounded in the analyses of the relations of teaching performances to pupil achievement.

Volume III reports the details of the analyses performed on the original data. The chapters in that volume also report the partial correlations of the original codes with pupil achievement scores. Means, standard deviations and frequencies of the codes are provided there.

Evaluating the Accuracy of the Measures of Teaching Performance

Chapters 7, 8 and 9 report the results of regressing in various ways pupil scores on teaching performances. How are these

various ways pupil scores on teaching performances. How are these results to be interpreted given the complexity of the original data set and what we know about its characteristics? At this point it will be useful to recapitulate what we know about the measures of teaching performance and to evaluate their accuracy.

1. The original event observations are probably highly accurate. In the case of both systems the developers and experienced observers worked with the observer-trainees until they coded accurately. Thus, the process was standardized both in form and in the standard of accuracy required.

2. Quality control was maintained on all observations. Errors in coding were corrected; dubious recordings were checked with the observers; ambiguities were resolved. The observers were under the supervision of a coordinator over the entire period of observation. Observers were encouraged to keep their rate and the comprehensiveness of their observations at a high level.

Another precaution was taken to insure the accuracy of the observations. All forms were edited for internal consistency. The developer of the APPLE system had a rich data base of previous observations to serve as a guide for evaluating the event forms. The RAMOS developers had extensive observations of teachers from which they had derived conceptions about regularities to be expected in the RAMOS data. The editing of the forms, therefore, was a process of checking the data for its plausibility and correspondence with previous observations.

3. Differences in observers in rate of coding are probably not a systematic influence on the data. Observers were randomly assigned to teachers so differences in rate are averaged out by teacher; they are not biased by observers being assigned systematically to the same teacher. Thus, two observers will give a teacher high scores in a code though they may differ in the absolute values of these scores. But the relative level of the score is probably accurately estimated.

4. Where differences in observers occur, they are a function of the complexity of the events being recorded. Both systems required continuous recording and the careful observation of different pupils. The systems are quite different from other observation systems in which the observer simply counts prespecified categories of teacher behavior. Such systems require the observer to watch the teacher, and many of them take only periodic time-samples of teacher behavior. APPLE and RAMOS, however, require continuous recording of multiple events. But again the relative position of a teacher is not likely to be easily under-or over-estimated.

5. The system of combining the codes into categories does not necessarily improve reliability. But given the accuracy of the original observations, the new category score is based on a larger number of observations than the original codes. Thus, if discussion and explaining are conceived of as aspects of the same instructional variable, the score representing their combination is based on a larger number of recorded events.

Also the relative frequency score is more likely to be a more stable estimate than the original counts. These original counts (what the observer has recorded) may be off from their "true value" but they would have to be markedly deviant to make a significant difference in the relative frequency. It is for this reason that differences in rates of recording among the observers are not likely to affect a teacher's position on a score scale.

As we noted at an earlier point the problem of reliability is estimating the accuracy of the mean values. These estimates would be better if there had been more occasions of observation per teacher. But studies of this kind are required to balance the number of observations per teacher against the number of teachers to be observed. Since the number of teachers is used to determine the degrees of freedom in analyses of relations of performances to outcomes, this number cannot be reduced too much simply to increase the number of observations per teacher.

The ultimate test of the value of the measures is their predictive validity. As the reader will see, many of these performances predict differences in pupil achievement. If the measures of teaching performance were unreliable, we may have missed finding some performances which are related to these differences. If these measures were unreliable, however, it is not because the original observations were highly inaccurate but because teachers are far more variable from day to day than we have reason to believe.

The Use of the Teaching Performance Data

The mass of data gathered through observation was reduced through the procedures described in this chapter. The developers of the systems, Lambert and Hartsough for APPLE, Calfee and Hoover for RAMOS, and Elias for the WORK DIARY, arranged for the coding and scoring of the original data. They then performed numerous analyses on these scores. The information on means, standard deviations, frequencies, and intercorrelations are reported in their respective chapters in Volumes III and V. These analyses were used in planning all subsequent reorganizations of the data.

The basic problem that had to be solved was to reduce the number of original scores to a meaningful and manageable number. Several regression analyses were run with the original sets but there was too much collinearity in the data. Also the number of variables had to be reduced so that there were fewer variables than teachers.

Factor analyses were tried for this purpose. The results were not entirely satisfactory. We, therefore, developed a model of the structure of teaching performances to regroup the variables. A linear transformation procedure which preserved the original patterns of relations among the variables was then used to form new scores for the combined categories from the original scores. It is important that the reader understand that in this process data were not discarded.

Several features of the data are worth noting and remembering when reading the results of the regression analyses. The distributions of the original variables were usually skewed. The frequencies of many of these original variables were low--teachers really do many different things. But at almost any stage of analysis patterns appear in the data. A fuller analysis of the data than we had time or money for is required to find these patterns. But in regrouping these original variables we preserved the original dimensions so that patterns are apparent in the resulting correlation matrices. We have looked for suggestions of these patterns in interpreting the results of the regression analyses.

These observational data describe what teachers do. They do not look like some other observational data such as those gathered by observing a few aspects of teaching. The intercorrelations among the variables and the interdependencies among them are apparent. Most striking is the difference in the correlation matrices by subject and by grade.

The 22 variables organized in the ways described here locate each teacher in a multidimensional space. We, therefore, used multivariate techniques, multiple and stepwise regression and path analysis, to study their relations to differences in pupil achievement. These 22 variables appear in all subsequent analyses.

The next chapter, Chapter 5, describes the measurement of the other variables in the study. Chapter 6 gives details on the

scoring of all the variables including teaching performance variables and the methods of data analysis. Then in Chapters 7, 8 and 9 we describe the use of these variables in the multivariate analyses which relate teaching performances to differences in pupil achievement.

BEGINNING TEACHER EVALUATION STUDY: PHASE II

FINAL REPORT: VOLUME I, CHAPTER 5

THE CONCEPTS AND MEASUREMENT OF PUPIL, TEACHER AND SCHOOL CHARACTERISTICS

Portions of this Chapter Written By:

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INTRODUCTION

In Chapter 4 we discussed the concepts and measurement of teaching performance. In this chapter we will discuss the major concepts underlying the selection or development of instruments to measure pupil, teacher and school characteristics and the procedures used to collect that information. The procedures for deriving scores from the complete measurement system will be described in Chapter 6. Figure 2.6 and Table 3.1 (reproduced on the following pages) describe the range of variables and the general characteristics of the measurement systems used in this study. As can be seen from Figure 2.6 and Table 3.1, an attempt was made to make the measurement system very comprehensive. One of the purposes of Phase II of the Beginning Teacher Evaluation Study was to develop appropriate instruments that could be used in the subsequent phases of the study. Therefore, we either constructed an instrument or a measurement procedure or selected a previously developed test or procedure to measure variables in each of the domains portrayed in Figure 2.6.

The details on the development of the various components of the system, the descriptions of specific tests and procedures, and information on the analyses of the tests and procedures are presented in other volumes of this study. Volume III describes fully the observation systems used. Volume IV delineates the measurement procedures that were used to assess pupil, teacher and school characteristics in this study, and Volume II describes the procedures by which the data were gathered using these measures.

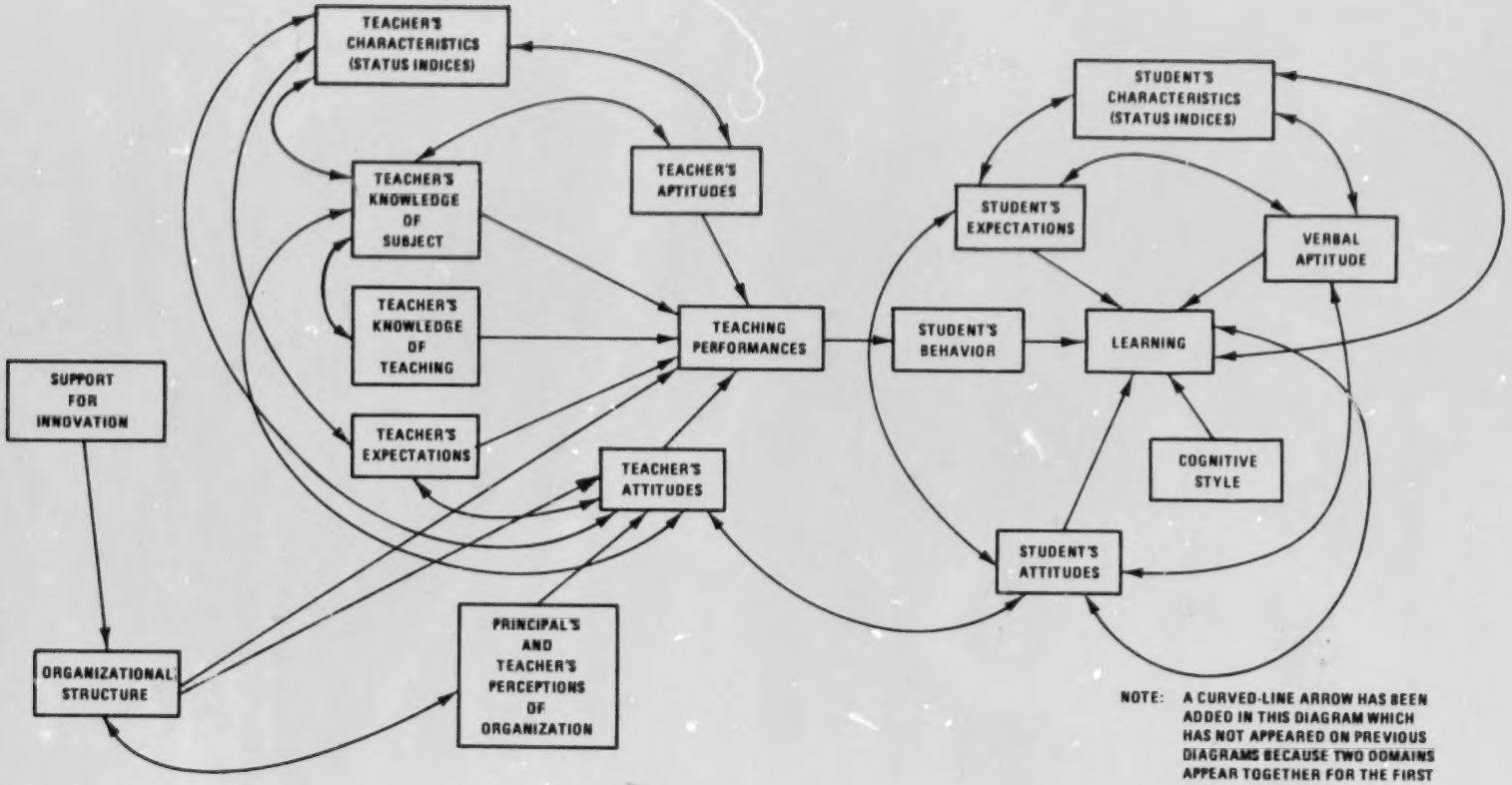

Figure 2.6. A Structural Model of the Domain of Variables Influencing Teaching Performances and Children's Learning

NOTE: A CURVED-LINE ARROW HAS BEEN ADDED IN THIS DIAGRAM WHICH HAS NOT APPEARED ON PREVIOUS DIAGRAMS BECAUSE TWO DOMAINS APPEAR TOGETHER FOR THE FIRST TIME IN THIS DIAGRAM. A CURVED-LINE ARROW HAS BEEN DRAWN BETWEEN TEACHER'S ATTITUDES AND STUDENT ATTITUDES. STUDENT BEHAVIOR IS REPRESENTED FOR THE FIRST TIME IN THIS DIAGRAM.

Table 3.1. The Time Sequence of the Measurement Procedures

VARIABLE	RESPONSE SYSTEM		MEASUREMENT PROCEDURE		DESCRIPTIVE REPORT	SEQUENCE IN TIME		
	Internal	External	Performance on Representative Sample of Tasks	Performance in Situation		Before Teaching	During Teaching	After Teaching
Learning	X		X					
Student Behavior		X		X		X	X	X
SE_{xp}	X				X	X		
$V_{er}A_{pt}$	X		X			X		
$C_{og}S_t$	X		X			X		
SA_t	X				X	X		X
TP		X		X			X	
TA_t	X				X	X		
TE_{xp}	X				X	X		X
TK_{te}	X		X			X		
TK_s	X		X			X		
TA_{pt}	X		X			X		X
$TP_{er}O_r$	X		X		X		X	X
O_rS_t		X	X		X		X	
$S_{up}I_n$		X	X				X	

SE_{xp} - Student's Expectations

$V_{er}A_{pt}$ - Verbal Aptitude

$C_{og}S_t$ - Cognitive Style

SA_t - Student Attitude

TP - Teacher's Performances

TA_t - Teacher's Attitudes

TE_{xp} - Teacher's Expectations

TK_{te} - Teacher's Knowledge of Teaching

TK_s - Teacher's Knowledge of Subject

TA_{pt} - Teacher's Aptitudes

$TP_{er}O_r$ - Teacher's Perceptions of Organization

O_rS_t - Organization Structure

$S_{up}I_n$ - Support for Innovation

Types of Variables Measured

The variables measured in this study may be described in terms of general characteristics and the measurement procedures used to gather data on them. There were four major types of variables measured: state variables, performance variables, trait variables, and variables associated with characteristics of individuals. The variables were measured either by eliciting performances on a set of representative tasks, by observation of behaviors in natural settings, or by gathering information about persons and systems via questionnaires and interviews. The measurement procedures were used at different times in the course of the study. The referent for describing times at which various measurements were taken is the period of observation of teaching and student behavior that occurred from February through May of the year of this investigation. Measurements are located as occurring before, during and after this period. Measurements may also be differentiated in terms of whether they were samplings of internal or external events, that is, events which could not be directly observed or could be directly observed.

State Variables

A state variable is a condition of a person or system at a particular point in time. Teachers' and students' attitudes and expectations are examples of state variables. These variables describe attitudinal states or expectation states in which either the teacher or the student may be found at a given point in time.

The state variables associated with students are students' attitudes and students' expectations. The state variables associated with teachers are attitudes, expectations, knowledge of the subject being taught, knowledge of teaching the subject, and perceptions of the organization. There are two domains of state variables associated with the system or environment of teaching: organizational structure and support for innovation.

State variables have two characteristics: (1) they may fluctuate during the time of the study and (2) they are expected to be different for different individuals. How much and in what ways a state variable varies over time can be determined only by sampling the variable periodically under a variety of conditions. The problem is that to sample fluctuations in these states requires frequent measurements of them. But frequent measurements cannot be made easily when teachers and pupils have other work to do. We did not want to forego measuring such variables, however. We sorted the possibilities into two kinds, states less likely to change except under unusual circumstances, and states likely to change over the year. We measured the first kind only once and assumed that the relations of these to other variables would represent the general pattern of how these states were related to other variables. The second kind, states that might change more as a consequence of the year's experience, were measured twice. Student attitudes and expectations and teachers' expectations were measured before and after the observation of teaching.

Some teacher state variables were measured only once because we assumed that they would not change dramatically over the course of a year, the teachers' knowledge of the subjects taught, for example. We expected the sum of what the teacher knew to be related to teaching performances. We assumed that changes during the year were not likely to be great, and that they would not change the relation of knowledge to performance.

State variables which are assumed to be generally stable have reached their condition at a particular point in time because of the influence of factors extraneous to the immediate situation. Thus, we assume that at the beginning of the year teachers start with attitudes toward reading and mathematics which are the product of previous experience in these two subjects. In general, the greater the amount of previous experience influencing a state variable, the more likely it is to be relatively stable.

We also expect state variables to be influenced more by general features of situations than by specific and highly variable features of situations. Reading is a task with which a child has had considerable experience. A second-grade child, for example, has had at least one school year of daily experience in reading. The child is familiar with the nature of the task, the expectations and goals set for the task, and has memories of successes or failures in attempting to learn to read. Second-grade experience to some extent recreates the experiences of the first grade because the tasks, although different at the second grade, are similar in

character to those with which the child has had previous experience. The second-grade teacher's methodology or teaching style may be different than that of the first-grade teacher. The materials may be more interesting to the child or more diversified or more challenging. These changes in the specific characteristics associated with the reading tasks of the second grade may influence the child's attitude during the second grade. But we generally expect the previous experience with reading, at least initially, to be a major determinant of the state of the child's attitudes or expectations. The more experience the child has with particular reading tasks, the more we expect the influence of previous experience to affect the child's state, and we expect the state to be more stable and less susceptible to current and immediate influences. But the child's attitudes and expectations may change somewhat during the year. To allow for this possibility, children's attitudes and expectations were measured at the beginning and end of the year. Some teachers may also have a marked influence on children's attitudes and expectations; therefore, the differences in these two measures may be used to see if some teachers influence attitudes and expectations more than others.

Teachers' attitudes similarly are likely to be fairly stable states because of the teachers' longer experience with the attitude-object. Only teachers who had at least three years teaching experience participated in this study; therefore, we expect such state variables as their attitudes towards teaching, towards the teaching of reading

and mathematics, and towards education to be less susceptible to influence by the particular conditions in which they find themselves in any given school year. Similarly we expect teachers' perceptions of the organizational structure of the school to be influenced by their prior experiences and school organization. With few exceptions, the teachers in this study had been in the school one or more years prior to the study. Their perceptions of the organization are likely to be stable.

Teachers' expectations about students are probably a product of previous experience and immediate experience. Teachers probably learn general expectations for different types of students. We hope that expectations are influenced only by a particular child's actual performance; however, evaluation of the child's current performance is influenced by the teacher's previous experience with children. Further, the way in which the teacher interacts with the child may be determined by the teacher's experience with that child or other children so that the teacher acts in a way that will eventually confirm his or her expectations about how the child will perform. To the degree that teachers act in a way likely to confirm an expectation about a child's performance, teachers' expectations may be a relatively stable phenomena. However, there is very little data on the stability of such expectations; therefore, we decided that we would estimate it by measuring teachers' expectations at the beginning and end of the year.

The particular social system of the school in which the teacher is teaching and the student is learning has characteristics which are indicators of the conditions in which teaching and learning are occurring. These conditions serve as stimulators of performance; create motivational and reward systems; and establish values and normative rules which guide actions.

Variables associated with this system are expected to be relatively stable because they are characteristics of an institution which does not change in its significant features over relatively long periods of time. For example, we do not expect the administrator's style to change to any great degree since it is related to a variety of factors which do not vary markedly in the course of a year. Characteristics of the school have been included as state variables.

As the above discussion suggests, state variables are expected to be relatively stable characteristics of individuals and systems. Even though we must allow for the possibility of changes in these states as a function of particular circumstances, even the manner in which the particular circumstances influence the state variable is determined by the state of that variable. Further, such characteristics of the person have been acquired because the process of acquiring them has been to some degree rewarding for the individual. We do not expect marked changes in them, therefore, unless adopting a new attitude or modifying an expectation or changing a perception is likely to provide some kind of satisfaction for an individual.

The reader will recall that in all cases we have predicted that these state variables will act as causal agents on other variables. There are two reasons for these predictions, both previously stated: the states exist prior in time to a particular observed teaching performance or measured student learning, and the nature of the phenomena involved is such that we would expect them to have a direct influence on specific dependent variables such as teaching performances or student learning.

Trait Variables

Trait variables are acquired repertoires of responses that may be transferred from one situation or task to another and that either determine how the person will react and interact in the new situation or will facilitate or inhibit performance in the new situation. Aptitude variables are examples of this kind of variable. Student verbal aptitude and cognitive style, teacher aptitude variables and teacher cognitive style are the trait variables measured in this study.

In general we expect trait variables of this kind to be highly stable. The exception to this general rule is found in cases where the learning task has been designed to increase a particular aptitude. For example, we do not expect cognitive style to vary, particularly in the case of older children and adults, as a function of the particular tasks in which they may be involved. By contrast, verbal aptitude may increase, particularly when the person is learning new symbol systems, as in the case of the Mexican-American child who may have high verbal

aptitude as measured by Spanish language tests, but low English language verbal aptitude. These children, as they learn the new symbol system, show measured increases in verbal aptitude as measured by the typical verbal aptitude test. A change of this kind should present no problem to the investigator if the measurement of aptitude is made prior to the measurement of the interventions that are supposed to influence the development of aptitude or the learning of other skills and knowledge. In this study, if the child is acquiring new verbal aptitude skills, this acquisition may be reflected in the change in reading scores.

Performance Variables

Performances, as we indicated previously, are sets of actions that may be observed. Some of these performances, however, must be measured indirectly. The relevant example is children's learning. Presumably children are making a very large number of learning responses and some of these responses are acquired as stable patterns of performance. We estimate the degree to which the relevant responses have been acquired by providing the child with a set of tasks which if performed accurately or correctly may indicate the degree to which the relevant responses have been learned. Scores on reading comprehension tests are used in this way to make inferences about the child's ability to understand what he or she reads. Other performances, such as the actions of a teacher in a class or the behavior of students during the class may be observed directly.

Student performance, such as that involved in reading comprehension, is expected to change, and this change is the object of investigation in this study. Little is known about the variability of teaching performances or the conditions under which they may vary. Further, until more is known about the relations of teaching performances to children's learning, it is impossible to judge whether or not teaching performance should be highly stable or relatively variable.

Variables Associated with Characteristics of Individuals

The individuals in this study, both teachers and students, have characteristics other than those measured by state, trait and performance variables. These characteristics are indices of prior experience or conditions in which the child or the teacher is currently living. The socioeconomic status of the child's family is an indicator both of the opportunities for learning and stimulation to learn currently available to the child as well as an indicator of the kinds of learning experiences the child is likely to have had prior to the time at which his or her learning is measured. Similarly the amount of teaching experience of a teacher is an indicator to some degree of what the teacher has learned about teaching.

These indicators are characteristics of the social system in which both teachers and children live and have lived. They are indirect measures of the kinds of socialization processes that have influenced both the teacher and the child. They are not direct measures of the socialization processes, but are known to be highly correlated with them.

Thus, characteristics of the systems in which teachers and children have lived are assumed to be indices of stable factors which have had long-term as well as immediate consequences on the behavior of both the teachers and the students.

Summary

Of the four categories of variables, we expect only performances to be changeable. We expect two of the categories, traits and characteristics of individuals, to be stable. We expect some state variables to be relatively stable and some less so.

These differences among the variables determined the general character of the measurement system. Performance variables must be sampled at different points in time in order to capture the variation in them. Trait variables and the characteristics of individuals may be measured at any point in time since they are not expected to change during the course of the investigation. Some state variables are assumed to be sufficiently stable over the year that any sampling of them is likely to be representative. Others are expected to be more variable and were sampled at both the beginning and end of the year.

Trait variables are expected to be constant over time and to act as causal agents. State variables are also predicted to be causal agents because the state of a person influences how he or she acts. Thus the structural model in Figure 2.6 predicts causal relations between state and trait variables and teaching performances and pupil learning. Characteristics of individuals

which are indices of effects of perduring events are not predicted to be causal agents because they are "weak" indices of the causal agents (this point has been discussed fully in Chapter 3).

Student and Teacher Test Batteries

Many of the student and teacher measures were tests of the type with which the reader is familiar, some of which are those generally available and some of which were developed specifically for this study. The children's learning measures are the best example in this latter category. We used both standardized tests of reading and mathematics, the California Achievement Test,[1] and tests of reading and mathematics specifically developed for this study, such as the measures of decoding skills, reading achievement (comprehension), reading applications and mathematics applications.

Students' Learning

The battery of instruments used to assess student skill learning included norm-referenced and domain-referenced tests. The reliabilities of these tests ranged from .63 to .95 and from .73 to .94, for second and fifth grades respectively. Most of the reliabilities are in the upper .80's to low .90's range.

The reading tests included norm-referenced measures of comprehension abilities and domain-referenced measures of decoding, comprehension application skills. A matrix of the domain of

[1] CAT Tests of Reading Comprehension, Mathematics Computation and Mathematics Concepts. Copyright © 1970 CTB/McGraw-Hill, Monterey, California.

reading comprehension skills was developed for selecting the items in the comprehension and application tests. The domain included among the dimensions, main idea, relation and detail questions at both the literal and inferential levels of comprehension. The tests, their developmental processes, and their reliabilities are described in greater detail in Volume IV.

The student learning tests were administered twice, early and late in the data-gathering year. The student tests contain the content and use the procedures common to most paper-and-pencil tests. A reading comprehension test, for example, presents a child with reading passages which he or she reads silently. Each passage is followed by a number of questions on the passage to which the child responds. The decoding test presents a child with a series of words or letters which require correct identifications (see below).

DECODING: ROOT WORDS*[2]

The teacher reads the following directions: "Look at the first word, the word with the line under it. It is the root word for one of the three other words in the line. Find the word that is made from the first word." The teacher then reads the root word. The child X'd the word that he or she thought incorporated the root word.

Root Word		Choices	
fly	floating	flaps	flies
near	neater	need	nearer
carry	careful	carrying	carrot

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[2]These and all other tests marked with an asterisk are copyrighted by Educational Testing Service.

A reading applications item is one in which the child is presented with reading material selected from the out-of-school world, such as labels, directions and newspapers (see below).

READING APPLICATIONS*

Directions: Put an X on the program about the San Diego Zoo.

2:00 p.m.	[4]	Baseball [Color] Teams to be announced. (Runs to 4:00)
	[6]	Top Cat - Cartoons
2:30 p.m.	[2]	Children's Variety [Repeat] Today the show goes to Detroit to watch cars being assembled (60 minutes)
	[6]	Visit the Zoo [Special] Famous San Diego Zoo is toured.
3:00 p.m.	[6]	Music Beat

Mark the letter of the coupon that shows you want to order <u>both</u> the pictures and the paints.

Picture and Paint Set
Box 2039
Battle Creek, Michigan 49015

A. Please send me one Cartoon Picture. Enclosed are 25 cents and one box top.

B. Please send me all four Cartoon Pictures. Enclosed are 50 cents and one box top.

C. Please send me all four Cartoon Pictures and the Paint Set. Enclosed are $1.00 and two box tops.

D. Please send me the Paint Set. Enclosed are 75 cents and one box top.

A mathematics computation test is a set of problems for which the child computes an answer and selects among answers offered to him or her. A mathematics application item requires the child to use mathematical concepts and skills in a practical problem (see below).

MATHEMATICS APPLICATION*

Menu	
Soups	
Onion Soup	.60
Vegetable Soup	.75
Sandwiches	
Sliced Turkey	1.30
Roast Beef	1.50
Tuna Fish Salad	.95
Grilled Cheese	.75
Chicken Salad	1.10

Here is a menu. What would be the cost of your lunch if you had a cup of onion soup and a tuna fish salad sandwich?

$_____

Students' Attitudes and Expectations

Students' attitudes towards reading and mathematics were measured by asking them questions about how they felt about these subjects. The reliabilities for these kinds of measures ranged from .67 to .70 and from .75 to .81 for second and fifth grade respectively.

STUDENT ATTITUDE - SECOND GRADE*

1. When the teacher asks me to think up some math problems, I feel HAPPY ? SAD

2. When the teacher gives me a story that is too hard to read, I feel HAPPY ? SAD

.

.

STUDENT ATTITUDE - FIFTH GRADE*

1. Reading is the hardest thing I have to do. YES ? NO

2. I get nervous when the teacher asks me to do a math problem at the blackboard. YES ? NO

.

.

Students' expectations were measured by two kinds of items. One type of item asked them how they expected to do in reading and mathematics (see below). The other presented the pupil with a reading passage or a mathematics problem and asked them if they thought they could perform the indicated task (see below).

STUDENT EXPECTATIONS - SECOND GRADE*

Will you be a good math student next year?

_____ I will be very good in math.

_____ I will be O.K. in math.

_____ I will not be too good in math.

Here are some math problems. Put an X on the problems you think you can do. Do not try to solve the problems.

2 5 + 1	3 4 + 2	8 - 6
3 + 7	6 + 5	268 + 123

Will you be a good reading student next year?

_____ I will be very good in reading.

_____ I will be O.K. in reading.

_____ I will not be too good in reading.

Here are some things to read. Put an X on the ones you think you can read.

The Cat is here.	Where is that silly alligator?	If we would be sincere, we should leave.

Students' Aptitudes

Aptitudes were treated as a multi-factor concept to permit the analysis of interactions between specific student aptitude factors and achievement. A standardized general aptitude test was used which measured memory, vocabulary, facility in making analogies and classification skills.[3]

Literature relating cognitive style to pupil learning and to school success prompted the inclusion of an embedded figures type test as a measure of learning style.[4] The person taking the test is asked to identify a figure which is embedded in a more complex figure. This reference-figure is constant across a series of items in which the more complex figure is changed and the referenced-figure is moved in its position with respect to this more complex structure. Cognitive style measures correlate moderately or insignificantly with verbal aptitude measures which do not involve verbal reasoning or disembedding

[3] Short Form Test of Academic Aptitude © 1970 CTB/McGraw-Hill, Monterey, California.

[4] Group Embedded Figures Test. Copyright © 1971 Consulting Psychologists Press, Palo Alto, California.

(r = .18).[5] Because aptitudes were expected to be relatively stable, each of the measures was administered on a single occasion. The reliabilities for the cognitive style measure were .81 and .90 at fifth and second grade; for aptitude the reliabilities were .93 and .94 at the same grade levels.

Validity of the Pupil Measures

Each test selected for this study was chosen or built to measure the specific construct in each domain of variables. Its validity may be judged in one or all of three ways: (1) the degree to which the questions or tasks in the instrument or procedure sample the dimensions of the domain of behaviors; (2) the correlation of the measure with other measures of a similar kind; and (3) the correlation of the measure with a criterion. The study itself is a validity study; therefore, from the viewpoint of evaluating an instrument, the data will tell us which measure predicts which criterion. But that is not what people usually have in mind when they ask, is the test valid? This question usually means, what is the test measuring? How did you know when you selected or developed the test that it probably would measure what you wanted measured?

Pupil Achievement Tests. The domain of reading was defined as the processes of comprehension, including literal and inferential skills, applications and decoding skills. The objectives of the state of California were used to construct a matrix of relevant content. After

[5] Witkin, H. A., Moore, C. A., Goodenough, D. R. and Cox, P.W. Field-Dependent and Field-Independent Cognitive Styles and Their Educational Implications. Unpublished manuscript, Educational Testing Service, 1975.

an examination of the content and psychometric properties of standardized tests of reading, the Reading Comprehension Section of the California Achievement Test Battery was selected for inclusion in the battery. The Reading Achievement, Reading Applications and Decoding Tests were constructed for this project. Items for these three tests were selected or constructed which were measures of those objectives. The Applications Test includes reading tasks that are taken directly from out-of-school tasks that require reading. The Decoding tasks are identical to those a child confronts in reading lessons in the school. All these tests were selected or constructed to have content and domain validity.

Two mathematics tests, Concepts and Computations, were sections of the California Achievement Test Battery. The content of these tests was checked against the objectives of the state of California for relevance to the purposes of this study. The Mathematics Applications test was built by using some items from the National Assessment testing program and by building items similar to them. These items are performance tasks. Each task is a problem from life in which mathematical concepts and skills have to be applied. These measures also were selected or constructed to have content and domain validity.

We do not know the extent to which the two Applications tests are a representative sample of out-of-school tasks. No one has surveyed the range of task-demands or possibilities. We made common-sense assumptions and used our experience to select tasks.

Elementary school children read signs, labels, menus, television schedules and the like. When they buy candy or food, they have to add prices of items to see if they have sufficient money to purchase what they want. They have to make change. These tests contain the most common tasks a child is likely to meet out of school. Pupil performance on the battery was examined after the fall administration. Conventional techniques for estimating internal consistency and item difficulty were used. Those results and correlations with other measures are discussed in Volume IV.

Pupil Attitude and Expectation Measures. To build attitude measures one must first define the domain of attitude. We did this in a relatively simple fashion. Attitude in this study is a stated preference. We asked the child if he or she liked reading or mathematics.

There are two problems with this measure's validity. One is that the responses might be loaded with a social desirability factor; that is, the child will say that he or she likes reading or mathematics because that is the socially desirable answer. We tried to protect against this possibility by the way we administered the tests. The scales were administered by people other than their teachers so pupils probably had less reason to dissemble; the range of responses suggest that the children answered honestly.

The same views and arguments apply to expectations. Children were asked how well they would do that year and to select problems or sentences they were able to handle. Expectations are treated as

a domain of state variables which comprise beliefs about one's ability to perform or master certain tasks.

The other problem is that the measures of aptitudes and expectations may be limited samples of those behaviors. The measures of students' attitudes presumably sample the child's current preferences and feelings. But the point is frequently made that attitudes are best measured by actions. This point has some merit. But it is also true that a person may have beliefs, preferences and feelings that are not always experessed in actions. A child may dislike mathematics but because of the social constraints of the classroom will engage in mathematics tasks and in fact will learn mathematics.

The best instances of an attitude reflected in behavior are those where social pressures to act in certain ways are minimal. The child's "true" attitude towards reading, for example, may be more apparent by how much reading he or she does outside of school. (We have obtained data from parents about the child's reading habits, but this source may not be entirely reliable.) In general, however, we expect the belief-preference system to be correlated with the behavior system. Children have feelings about reading and mathematics. These feelings influence in some way their engagement in the learning tasks. These attitude-states elicit preparatory responses and probably stimulate or inhibit responses necessary for learning such as attending responses. The reason for including measures of this kind is to determine the relative influence of the states they sample.

We have assumed that if we asked a child about how much he or she liked reading, we would obtain a valid estimate of preference. This stated preference, we assumed, would be related to how motivated the child was to engage in reading and mathematics tasks in the school. We also assumed that asking children how well they would do this year in reading or mathematics and to select problems they think they can do or a sentence they think they can read would give a valid estimate of expectations.

We have already pointed out that some of the state variables such as expectations and attitudes may change. We measured both kinds of student variables at the beginning and end of the year. Thus, some measure of the change is available. If the measures at these two times are highly correlated, fluctuations in between are probably less important because one suspects the presence of a trend.[6] Trait variables, such as student aptitudes, which are more stable phenomena were measured once.

Teachers' Knowledge

Two major components of teacher knowledge were hypothesized to be important for the study: knowledge of the subject being taught and knowledge of teaching. Knowledge of subject matter is a familiar concept and its application in the teacher test battery is described below in this section. Knowledge of teaching, a more complex concept, involves not only the knowledge of techniques of

[6]More detailed psychometric information is included in Volume IV.

classroom management, teaching methods and teaching materials but the ability to apply that knowledge appropriately to a variety of students.

The reliabilities of the knowledge of subject tests ranged from .50 to .79; the reliabilities of the knowledge of teaching tests ranged from .51 to .67. (Reliabilities were not calculated in some instances. All teachers did well on the decoding test, for example. There was not enough variance to allow the assessment of reliability.)

Teachers' knowledge of teaching methods and teachers' knowledge of the subject being taught were measured with similar kinds of tests. Teachers' knowledge of reading was measured by using the same decoding skills tests that was used for fifth-grade pupils because we wanted to know how much formal knowledge the teacher had of decoding skills. As well as decoding tasks, teachers completed tests on root words, syllabification, affixes and questions on inferences from reading passages. The same Decoding, Root Words, Affixes and Syllabification tests were used because tests that would test the upper limits of teachers' skills would include so many unusual words that the teachers would have regarded it as an artificial test of their knowledge.

The teachers' knowledge of teaching tests had two kinds of items, one that sampled how well informed the teachers were about different methodologies for teaching reading and mathematics (see below); the teacher could mark more than one answer.

TEACHING OF READING: KNOWLEDGE*

A primary teacher who wished to check to see whether a child was having trouble understanding his work because he had problems in decoding as opposed to comprehension could

A. give him a standardized reading comprehension test.

B. have him do several pages in a workbook that require reading.

C. read a story to him and ask him questions about it.

D. have him read a story silently and write out the answer to questions from the chalkboard.

E. have him read orally without worrying about comprehension.

Which of the following is the definition of structural analysis?

A. a system of analyzing words into the letters and sounds which comprise them.

B. a system of analyzing words into common rhyming endings and beginning consonants.

C. a system of analyzing words into root words and additional morphemes which form derivatives, variants, or compound words.

D. a system of analyzing words into their parts of speech according to their use in a sentence.

E. a system of analyzing words into word families depending on the language in which they originated.

TEACHING OF MATHEMATICS: KNOWLEDGE*

A pupil should first learn which of the following numeration concepts before he can understand regrouping in addition and subtraction?

(A) Counting up to three place numbers

(B) Place value

(C) Digits

(D) Addends and subtrahends

(E) Counting by tens

A sixth-grade teacher would have her class develop a sieve of Eratosthenes primarily in order to help the pupils to

(A) understand the evolution of place value

(B) grasp the significance of number characteristics

(C) develop an easier way to factor numbers

(D) determine which numbers are prime numbers

(E) realize the value of ten as a base of our number system

The other type of item presented the teacher with problem situations and the teacher was asked to indicate what he or she would do if confronted with the case presented in the test item (see below); more than one alternative could be marked.

TEACHING OF READING: APPLICATION*

One of the primary girls in your class has just come to the United States from a Latin American country. She can read everything that the rest of the class is reading orally with an accent, but she frequently marks the wrong answers to comprehension questions.[6]

____ A. Listen closely to her and see if her accent is interfering with her oral reading.

____ B. She should not be reading English. Get a parent volunteer to teach her to read in Spanish.

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[6]The teachers were asked to mark each question solution with a +, -, or ? to indicate that the action was appropriate, inappropriate or that he or she was undecided as to its appropriateness.

____ C. Try to find out if she understands what she is reading by asking her oral comprehension questions after she has read silently.

____ D. Have her placed in an English-as-a-Second Language class, and with time the accent will become minimal.

____ E. Give her lots of experience in listening to and speaking English before you test her reading comprehension level in English.

TEACHING OF MATHEMATICS: APPLICATION*

A child in the first semester of second grade is so advanced that he can add problems that involve regrouping. Which of the following is generally considered to be the best course of action for the teacher to take in regard to such a child?

(A) Place him in the third grade.
(B) Expand upon the mathematics content presented to him.
(C) Give him more difficult assignments than the rest of the class.
(D) Allow him to help the slower learners in the class.
(E) Help him develop his reading ability with the view of accelerating him when both abilities are comparable

---

Teacher Aptitudes

Earlier research, such as the Coleman study (1966), has shown that teachers' verbal aptitude was consistently related to pupil achievement. Because of this typical finding, it seemed appropriate to include measures of this and other teacher aptitudes in the test battery. The aptitudes measured included tests of verbal ability, reasoning ability, memory and various types of divergent production. Like other trait measures, the teacher aptitude tests were given only once.

As mentioned earlier, cognitive style has been shown to be related to how pupils learn; it also has been shown to relate to how teachers teach and to classroom interaction of teachers and students. The embedded figures type test used with the fifth-grade pupils was also given to the teachers. Again, because this trait is relatively stable, the test was given on one occasion only.

The teacher aptitude battery produced four factors: verbal fluency, reasoning, memory, and flexibility. Details of the factor analysis may be found in Volume IV. The reliabilities of the tests ranged from .67 to .96.

Teachers' Attitudes and Expectations

Measures of teachers' attitudes about teaching reading and mathematics and their expectations of student performance in those subjects were included in the study. Teachers differ in their preferences for teaching different subjects and how they feel about the subjects themselves. Unlike the high school teacher who usually teaches in his or her major subject, the elementary school teacher typically teaches four or more different subjects. It would not be surprising if they preferred some to others.

We do not know how such variations in preferences affect teaching performances. Since the teacher is conscientious, a neutral or negative attitude may have little effect on performance or may affect the performances only in certain ways. The teacher with a negative

attitude may differ from teachers with a positive attitude in the diversity and complexity of the teaching performances.

Teachers were asked a series of questions about how they felt about teaching reading and mathematics (see below). We did not expect these attitudes to change substantially in the course of the year. The measure was administered once during the spring of the data-gathering year.

TEACHER ATTITUDE TOWARD TEACHING READING AND MATHEMATICS*

YES NO 1. Teaching reading is fascinating and fun.

YES NO 2. Teaching mathematics makes me feel secure, and at the same time it is stimulating.

YES NO 3. I really like teaching reading.

YES NO 4. Mathematics is a class in school which I have always enjoyed teaching.

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Teacher expectation measures involved the use of a procedure in which the teacher rank-ordered each child in his or her class in terms of their expected performance in reading and mathematics. Specifically, each teacher was asked to: "rank order the children in your class according to how well you think the child will do this year

on standardized tests of reading achievement." Similar directions were used to obtain rankings for each student in mathematics and a non-academic area.

Validity of the Teacher Measures

As is true of the pupil measures, each teacher test included in the study was selected or developed to measure the specific construct in each domain of variables. The validity of each test may, again, be judged in one or all of three ways: (1) the degree to which the questions or tasks in the instrument or procedure sample the dimensions of the domain of behaviors; (2) the correlation of a similar measure; and, (3) the correlation of the measure with a criterion.

The domain of teacher knowledge was defined as knowledge of the subject matter, teaching and the application of knowledge. Five tests were selected to assess teacher knowledge of reading. Four measured decoding and related skills and one inferential comprehension. Skills in mathematical computation were also assessed. The items in each instrument are specific to the skill being measured.

The knowledge of teaching tests were developed to test teachers' general knowledge of teaching reading or mathematics, as well as their ability to apply that knowledge to problem situations. We do not know to what extent the knowledge tests represent the domain. We assumed that tests of skills, knowledge and application were a reasonable conceptualization of the domain. Correlations among the measures are shown in Volume IV.

Teachers' attitudes about the teaching of reading and mathematics and their expectations of pupil performance in those subjects were measured quite directly. Teachers' attitudes, like pupil attitudes, are subject to the problem of social desirability. Teachers were guaranteed that all information collected would be completely confidential and that no one outside of the project staff would be able to link teacher or pupil scores with any participating teacher. There was no range in the scores of the attitudes of teachers about teaching. The scores were not used in the attitude domain of the model.

Expectations about pupil performance are a comprehensive sampling of the domain in the sense that each teacher ranked every child in his or her class in terms of predicted performance. Teachers' attitudes about teaching may or may not reflect the domain, but expectations as we defined and assessed them are less subject to that problem.

Teacher aptitudes were assessed with a variety of tests. The tests were chosen after reviewing the literature on these tests (see Volume IV and Chapter 1, Volume V). Four factors were produced by factor analysis, a process which suggests content consistency within each factor. A fifth test, cognitive style was retained as a discrete measure and score.

All of the measures, except aptitudes, are state variables. Knowledge and attitudes were measured once, expectations twice. The trait variables, aptitudes, were measured once.

Measurements of Characteristics of Individuals and Systems

Each individual in this study has a prior history of experience with which he or she enters the situations in which they were observed. The children, for example, may have been in one or more schools; some may have had more preschool experience than others; they come from different socioeconomic backgrounds. Such descriptors of background characteristics reflect the social learning history of the child.

Similarly teachers have been prepared in different colleges and universities; they have different amounts of experience; they may have taught in one or more schools; their formal educational preparation is different. Indicators of such experiences reflect what kinds of formal knowledge the teacher has acquired and the kinds of teaching experiences they may have had.

Indicators of these kinds are indirect measures of what the individual has learned and the kinds of attitudes and expectations they may have acquired. The amount of formal education that a teacher has acquired is an indirect measure of what the teacher may know. But such measures may also reflect other variables such as the teacher's range of interests and motivation. Similarly the kinds of institutions in which this training was received may be an indirect measure of aptitude since different collegiate institutions have different standards for admission and academic performance.

Other indicators are the only readily available measures of underlying variables in the social learning history of the person. The socioeconomic background of the child is such an indicator. It is generally assumed that the socioeconomic characteristics of the child's home and community determine the learning opportunities that are available to him or her, the kinds of stimulation for development that will have been provided, and the values and expectations that are set for the child by the adult community in which the child lives. While direct measures of such variables may be made, complex and elaborate measurement procedures are required that would have been far too expensive for a study of the magnitude of the one reported here. We could have, for example, interviewed parents about their expectations for their children; but that interviewing process would have been prohibitively costly for the number of children involved in this study.

As has been pointed out previously, indicators of the kind described are treated as indices rather than as the underlying variables themselves. For this reason, relations between these indices and other variables are predicted to be correlational rather than causal in character.

Status Characteristics of Children

Background characteristics of the children were obtained from two sources, the children's teachers and their parents. One of the two days during the fall testing was used by the teachers to fill out the

Pupil Survey Instrument by using the school records and other information they may have had. This questionnaire provided information for each student on his or her year of birth, sex, racial or ethnic group, the number of schools attended, and special school experiences in which the child may have participated such as Title I reading programs, bilingual programs, remedial reading programs, Headstart, and the Miller-Unruh Reading program. The teachers were also asked to estimate the child's socioeconomic status.

During the spring testing the teachers were asked to provide two additional pieces of information about these children, one, about their ability to speak English, and the other, about their attendance rate during the year. After surveying the data gathered in the fall on the classes and from experience gathered during observations, it was decided that precise information on the ability of each child to speak English was needed. Therefore, the teachers were asked to rate each child in terms of their ability to understand and speak English on a scale that ranged from no practical comprehension to native or bilingual proficiency. The teachers were also asked to give the frequency of the child's absences in terms of the number of days that he or she was absent each month.

The Parent Questionnaire provided information about both the parent and the child. This questionnaire, which has an English and a Spanish form, was sent home with the child at the time of the fall testing. The requested information about the child in the

questionnaire also covered the types of special school experiences that the child had had and whether or not the child ever attended preschool or kindergarten.

The parents also provided information about their own education and employment both in terms of their present employment and the type of work or position for which they had been trained. The parents were also asked about their mathematics background in terms of types of courses they may have taken.

Information on the child's out-of-school activities were also provided by the parents, including whether or not the child watched such programs as the Electric Company which might influence his or her ability to read. The parent also provided information on the types of reading materials that the child typically read, such as the family books or library books or comics or newspapers. Thus, the Parent Questionnaire provided a check on the information provided by the teacher as well as additional information about the parent and the child.

Seventy percent of the parents returned the questionnaire, and those not returned were mainly those which had been sent to families of lower socioeconomic status. The parents and teachers did not always agree on the child's special and preschool experiences. It is difficult to know who was more accurate. In our analyses we used teacher information for special school experiences such as Title I, bilingual and Miller-Unruh programs, and parent information

for preschool, Head Start and Follow Through programs. While there is no way of telling within the limits of this study which source of information was more reliable, we made this decision on the assumption that teachers had better information about special curricula within the school but parents had better information concerning special programs.

These questionnaires provided information that could be used as indicators of variables that would be correlated with children's learning. The amount and kind of the parents education, and the socioeconomic background of the family relates to such variables as the kinds of opportunities for additional learning and stimulation and reward for learning outside of school that are provided in the home.

Information on preschool experience enables us to distinguish between children who have had preschool experience and those who have not. This information is useful for the analysis of learning gains. Similarly, information on the English-language speaking ability of the child is useful for estimating the influence of this factor on the child's ability to learn to read and to do mathematics.

These questionnaires on background characteristics and experiences both for teachers and students provide information that enables us to sort the teachers and children into different groups for particular analyses; for example, it is possible to look at children in terms of the amount of preschool experience they have had or in terms of the out-of-school time spent in reading. The other use of these

indicators is that indicated in the structural model provided in Figure 2.6. Status characteristics variables are there shown as being correlated with these dependent variables.

Status Characteristics of Teachers

Similar information was obtained from teachers about their background such as their place of birth, their age, the amount and kind of their educational experience, their previous teaching experience, and the length of time in their present position. This information was obtained in questionnaire form at the time of the fall testing.

The Teacher Survey Instrument was also used to obtain information from the teacher on a number of other factors. The teachers were asked about their commitment to teaching and their satisfaction with teaching as a career. This information was used as a measure of the teacher's professional aspirations.

Teachers were also asked about the kinds of students that they preferred to teach. Each teacher described his or her effectiveness with certain kinds of students. This information has been used as one of the measures of teachers' attitudes.

Characteristics of the School System

A very large number of characteristics of the school and the school system may be identified. A substantial number of these characteristics such as the characteristics of the teachers and students are included in the information gathered in the measures

of the student's socioeconomic background, the teacher's attitudes, and the teacher's and student's expectations. In this section we will describe the formal characteristics of the school system other than those associated with the characteristics of individuals within the system.

The other characteristics are of two kinds, structural and stylistic. Structural characteristics are those that describe the arrangements of roles and positions within the organization. Stylistic characteristics describe the character of the interpersonal relations among the staff and the control of decision-making power.

Schools may differ structurally either in their administration or in their organization of teaching. The formal administrative structure may have varying levels of complexity. The organizational structure of the elementary school is relatively simple, but may be made somewhat more complicated by the addition of assistant principals and staff personnel responsible for a particular activity such as guidance counselors or reading specialists.

The structural organization may be further complicated by changing the organization of the teaching staff itself. Traditionally schools have been organized so that one teacher teaches one group of students. In the last two decades, however, ungraded schools and team teaching have been introduced as ways of diversifying instructional programs. These innovations require reorganization of the teaching system, so that, for example, one teacher may teach only reading

to several different groups of students, and another teacher teaches mathematics. Or two teachers may share two classes each teaching some portion of the curriculum to both classes. Such arrangements presumably change the nature of teaching in these schools. Programs of different kinds also require new organizational arrangements. Thus on the one hand we may have the traditionally organized classroom and on the other an arrangement of ungraded classes which combine and recombine for different purposes, each taught by several different teachers.

Similarly the character of interpersonal relations and administrative styles may differ by schools. The staff may be a close-knit working group or may be merely a collection of individuals. The school administrator may make major decisions himself or herself or may involve the staff in the development of new programs and in the reorganization of the curriculum.

The district system of which the school is a part may differ in terms of its structure. In this study very large school systems and small systems were included with consequent differences in the complexity of the overall governance system. Districts also vary in terms of their economic support base and the socioeconomic characteristics of their clientele. In this study three kinds of communities provided schools--urban, suburban, and rural communities. Such characteristics appear, however, to be minimally related to differences in children's learning.[7]

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[7]John Bianchini stated that he found in the ETS Anchor Study that differences among districts accounted for five percent of the variance in achievement in children's learning. (Personal communication.)

We reasoned that within-school differences in organizational complexity may be related to the willingness of the district to stimulate and support innovations. The logic here is that organizational changes within the school are more likely to have occurred if decisions had been made at the board and district level that such innovations were worthwhile. Therefore, the major characteristic of districts in which we were interested in this study was the degree of support for innovation.[8]

We did, however, attempt to assess one other characteristic of the district, namely its administrative style. Principals were asked to describe the administrative style of their superiors. But since we did not have an adequate sampling of principals within districts, this measure is treated as a characteristic of the principal because it is a variable that tells us what his or her perceptions are of this administrative system.

Two methods were used to obtain information relevant to structure and style variables. Both principals and teachers filled out questionnaires and rating scales. These instruments were used to assess perceptions of stylistic and organizational variables.

Listed below are the instruments that were used to gather this information and the types of variables on which each instrument provided information. Form pertains to organizational arrangements; control, to the degree of centralization of decision-making power.

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[8] M. Lockheed of the project staff conceptualized the domains of these variables.

INSTRUMENTS	ORGANIZATIONAL STRUCTURE Form	Control	ADMINISTRATIVE STYLE
Profile of a School[9]			
Teacher Form			X
Principal Form			X
School Climate Questionnaire[10]			
Teacher Form	X	X	
Principal Form	X	X	

The School Climate Questionnaire for teachers produced seven factors: principal leadership, principal help, instructional complexity, degree of teaming, student autonomy, aspirations and satisfactions. The Profile of a School instrument, teacher form, produced three factors: principal's administrative style, class climate, and student influence. The principal's form produced three factors: superintendent's administrative style, principal's administrative style, and student influence. The Support for Innovation variable was derived from answers to questions on the School Climate Questionnaire, principal form, and the Principal Interview.[11]

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[9] Profile of a School, Copyright © 1971, Rensis Likert Associates, Inc., Ann Arbor, Michigan.

[10] Developed by the staff of the Environments for Teaching Program, Elizabeth G. Cohen, Program Director. NIE Grant #NE-C-00-3-0062. Stanford University, Stanford, California.

[11] Principal Interview developed by the staff of the Environments for Teaching, Program Director, Elizabeth Cohen. NIE Grant #NE-C-00-3-0062. Stanford University, Stanford, California.

Each principal was interviewed from one and one-half to three hours. The interview was highly structured and was designed to obtain information on the following major variables: the dispersion of decision-making power and the criteria he or she used in evaluating teacher performance. The principal was also asked questions about staffing patterns and methods for evaluating reading and mathematics programs. Each principal was asked a series of questions relevant to these topics and was permitted to comment freely as he or she answered the questions. The interviewer, however, did not probe or follow interesting leads.

The decision-making dispersion or control variable assessed the degree to which curriculum and teaching decisions were made by the principal or were made jointly by the principal and staff. Questions on the evaluation of teaching performances asked the principal to specify his or her criteria for this evaluation.

The variables measured in the study have been described in terms of their general characteristics--state, trait, performance and characteristics of individuals and of systems. The predicted relationships among these variables has been discussed. As one kind of summary statement those relationships are shown graphically on a reproduction of the structural model we used. The model has been annotated to show the general characteristics of the variables (Figure 5.1).

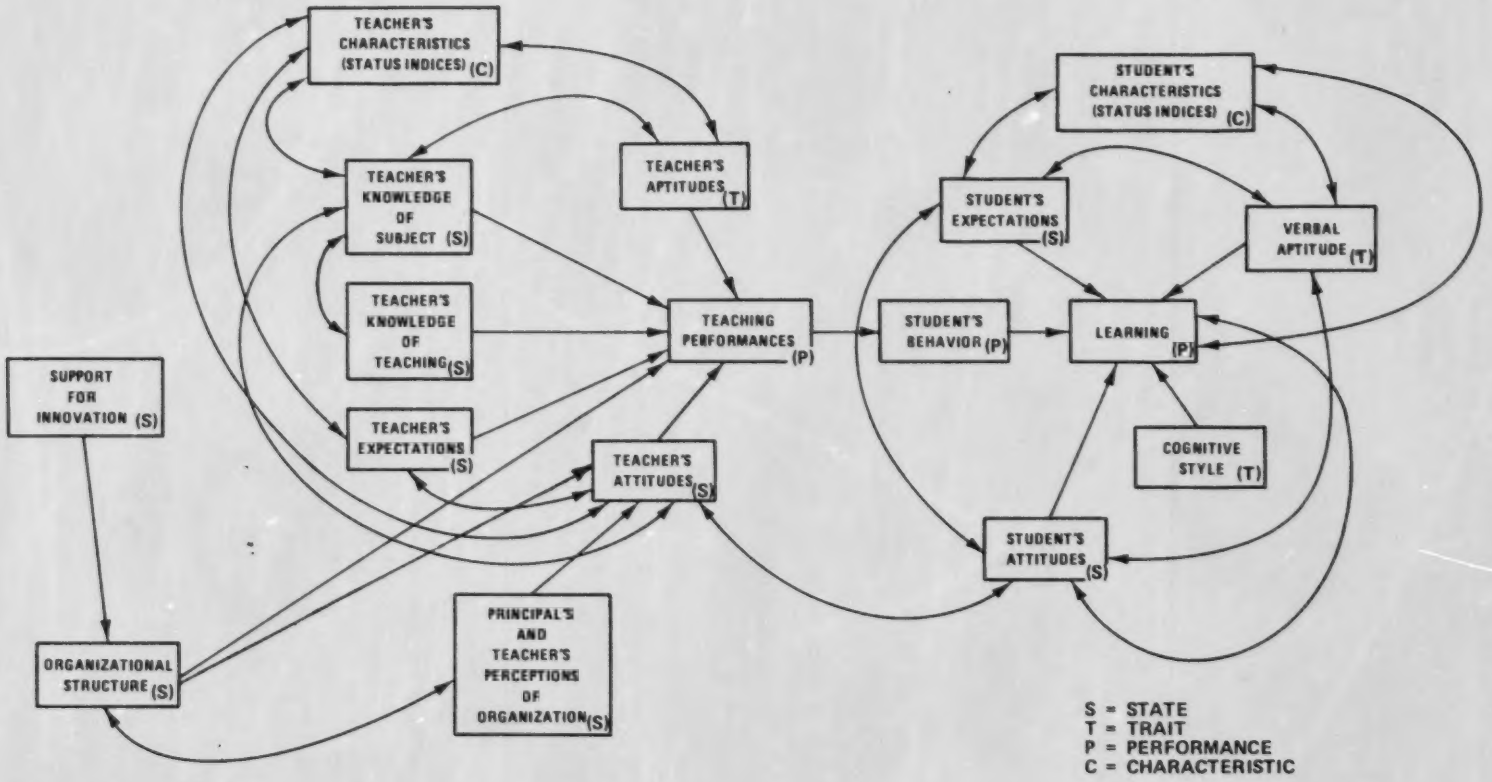

Figure 5.1. The Structural Model with Cell Entries Identified as State, Trait, Performance or Characteristic Variables

Validity of the Measurements of Characteristics of Individuals and Systems

All of the measures of characteristics were self-report measures. They asked the principal or teacher to describe the administrative structure of the school as he or she perceived it. The validity of such reports is of primary interest because many of the questions being asked were sensitive questions. The questionnaires and rating scales were filled in by each teacher individually and mailed to the project office. As part of the system for encouraging teachers to participate in this study, each teacher and principal was assured that only the project staff would see information on teachers and students. There is sufficient range in the scores derived from these instruments to believe that teachers had accepted the promise of confidentiality and were reporting their perceptions accurately. But these instruments, like all other self-report instruments, have well-known limitations. All scores, except those of the status characteristics of teachers, are factor scores, which suggests content consistency within each factor.

One of six interviewers conducted each principal interview. Interviewer bias was minimized because each interviewer followed exactly the same schedule of questions, and probing and following interesting leads was not part of the interview technique. Whether or not the principals reported their own feelings, perceptions, and behavior accurately is unknown. Most seemed to welcome the opportunity to talk about their schools. They too had been assured that all information was confidential.

Measurement Schedule

The research plan allowed for two consecutive days of testing of children in the fall and the spring. The same two days were also set aside for the testing of teachers, but only one of these days was used for the actual taking of tests. The other day was used to gather information from the teachers about their students and school characteristics. The testing days for all schools were scheduled as closely together as possible, but the practical necessities of finding available dates actually spread the testing in the fall and spring over approximately three week periods. There is no evidence in the data to suggest that these differences in the time of testing made any significant difference in the performance of either teachers or students. Volume II contains a description of the details of the scheduling and administration of tests.

Variables such as expectations were measured during both testing periods. Because of the heavy testing schedule, about half of the teacher aptitude tests were administered in the fall and the remainder in the spring. We assumed that the aptitude factors were sufficiently stable so that it was unlikely that there would be any change in performance on these measures if some of them were given in the fall and some in the spring. For the same reason the student and teacher cognitive style measures were given in the spring. With the exceptions noted above, all measures of trait variables were given prior to the observation of teaching. On the following pages Tables 5.1, 5.2, and 5.3 list all measures and the times at which they were used.

TABLE 5.1: STUDENT MEASURES

STUDENT VARIABLES	INSTRUMENT	RESPONSE MODES				TIME GIVEN		
		CONSEQUENT	PERFORMANCE	SELF REPORT	OTHER REPORT	BEFORE (FALL)	DURING	AFTER (SPRING)
Learning								
Reading								
Comprehension	CAT Reading Comprehension Test	X				X		X
Achievement	ETS Reading Achievement Test	X				X		X
Application	ETS Reading Application Test	X				X		X
Decoding	ETS Decoding Test	X				X		X
Attitude	ETS Attitude Survey			X		X		X
Mathematics								
Concepts	CAT Mathematics Concepts Test	X				X		X
Computation	CAT Mathematics Computation Test	X				X		X
Application	ETS Mathematics Application Test	X				X		X
Attitude	ETS Attitude Survey			X		X		X
Student Characteristics								
Aptitude	SFTAA	X				X		
Cognitive Style	CPP Group Embedded Figures Test	X						X
Expectations	ETS Pupil Survey			X		X		X
Status Characteristics								
Parent	Parent Questionnaire				X	X		
Teacher	Pupil Survey Instrument				X	X		
Student Behavior	APPLE Observations - Ap-1, 2 and 3		X				X	

TABLE 5.2: TEACHER MEASURES

TEACHER VARIABLES	INSTRUMENT	RESPONSE MODES: CONSEQUENT	RESPONSE MODES: PERFORMANCE	RESPONSE MODES: SELF REPORT	RESPONSE MODES: OTHER REPORT	TIME GIVEN: BEFORE (FALL)	TIME GIVEN: DURING	TIME GIVEN: AFTER (SPRING)
Knowledge of Subject: Reading Decoding Skills	Letter-sound correspondence subtest	X				X		
	Root Words subtest	X				X		
	Affixes subtest	X				X		
	Syllabification subtest	X				X		
Inferential Reading	Inferential Reading Test	X				X		
Knowledge of Teaching: Reading Knowledge	Primary or Intermediate Knowledge Test	X				X		
Application	Primary or Intermediate Application Test	X				X		
Knowledge of Subject: Mathematics Computation	Arithmetic Computation Test	X				X		
Knowledge of Teaching: Mathematics	General Knowledge of Teaching Mathematics Test	X				X		

TABLE 5.2: TEACHER MEASURES
(Continued)

TEACHER VARIABLES	INSTRUMENT	RESPONSE MODES				TIME GIVEN		
		CONSEQUENT	PERFORMANCE	SELF REPORT	OTHER REPORT	BEFORE (FALL)	DURING	AFTER (SPRING)
Aptitudes	Verbal Facility Test	X				X		
	Vocabulary Test	X				X		
	Memory Test	X				X		
	Figure Classification Test	X				X		
	Deductive Reasoning Test	X				X		
	Inductive Reasoning Test	X				X		
	Mathematics Aptitude Test	X				X		
	Finding Useful Parts	X						X
	Sentence Completion	X						X
	Topics Test	X						X
	Story Surprises	X						X
	Controlled Associations Test	X						X
	Making Sentences	X						X
	Listing Objects	X						X
	Planning Test	X						X

TABLE 5.2: TEACHER MEASURES
(Continued)

TEACHER VARIABLES	INSTRUMENT	RESPONSE MODES				TIME GIVEN		
		CONSEQUENT	PERFORMANCE	SELF REPORT	OTHER REPORT	BEFORE (FALL)	DURING	AFTER (SPRING)
Cognitive Style	Group Embedded Figures Test	X						X
Attitudes	Attitude toward teaching reading			X				X
	Attitude toward teaching mathematics			X				X
Expectations of Students	Rankings in reading and mathematics				X	X		X
Status Characteristics	Teacher Questionnaire			X		X		
Teacher Behavior	APPLE Observations		X				X	
	RAMOS Observations		X				X	
	Videotape Observations		X				X	
	Work Diaries			X			X	

TABLE 5.3: SCHOOL CLIMATE MEASURES

		RESPONSE MODES				TIME GIVEN		
	INSTRUMENT	CONSEQUENT/PERFORMANCE	SELF REPORT	OTHER REPORT	BEFORE (FALL)	DURING	AFTER (SPRING)
Teacher	School Climate Questionnaire		X				X
	Likert Profile of a School		X				X
Principal	School Climate Questionnaire		X			X	
	Likert Profile of a School		X			X	
	Principal Interview		X			X	

The observation of teaching performances occurred in the latter half of the year between February and May. Because the goal was to develop a comprehensive observation system, different schedules of observing teachers were used. A subset of 25 teachers was observed intensively. These teachers were observed on four different occasions within a two-month period by a pair of observers. On two of these occasions an APPLE observer and a RAMOS observer were paired, on the other two occasions either two APPLE observers or two RAMOS observers were paired. The remaining classrooms were observed on at least two occasions. One of these was an APPLE-RAMOS paired observation, while the others were either APPLE or a RAMOS observation.

The interviews of principals began in January and were conducted through March. Principals filled out the School Climate Questionnaire and a Likert Profile of a School rating scale during this same period.

Response Modes

There were four types of response modes used in the measurement system--consequent, actual, self-report and other report. The response modes are related to the student, teacher and school climate measures listed in Tables 5.1, 5.2, and 5.3. There were two types of performance modes, one in naturalistic situations (actual mode), the other in test situations (consequent mode). Both teachers' performances and

student behavior in the classroom were observed live. (Videotape recordings were also made on some occasions--each teacher's class was videotaped at least once.) Performance tests of two kinds were given to both teachers and students. Tests such as aptitude measures presented general tasks which the teacher or student performed. The knowledge tests presented items requiring the respondent to know something or be able to do something. The data gathered through these types of performance measures are (consequent mode) relevant to the two major variables, the independent variable, teaching performances and the dependent variable, student learning. Observations of actual teaching was the other kind of performance data collected in this study.
of questions about the respondent's views, perceptions, attitudes and expectations. Attitudes, for example, were measured by asking each person to indicate preferences by responding to statements about the attitude-object. Teachers' expectations were measured by asking the teacher to predict student performances in reading and mathematics. The principals stated their educational goals during an interview. Principals and teachers reported their perceptions of the organizational climate by rating various aspects of this climate.

Additional self-report measures included the description of the teacher's and principal's background and their views, opinions, and perceptions of the organizational structure in his or her school.

In general, the performance measures have the greatest validity since they sample the criterion behaviors. The reading tests are measures of ability to decode and use certain reading comprehension skills; the mathematics tests are measures of the ability to compute and use mathematical concepts. The teaching-performance measures are direct measures of what teachers do while teaching.

These measures produced a very large data base. The data from the measures had to be reduced to scores. The procedures for scoring are described in Volumes III, IV and V. A basic set of scores was used for the analyses. The organization of this set of scores and the procedures for their analysis is described in the next chapter.

BEGINNING TEACHER EVALUATION STUDY: PHASE II

FINAL REPORT: VOLUME I, CHAPTER 6

THE ORGANIZATION OF THE DATA FOR ANALYSIS: THE SAMPLE, METHODS OF SCORING, AND METHODS OF ANALYSES

Portions of this Chapter Written by:

Barbara Foltin

William Allen

The large array of tests, procedures for observation and the other kinds of instruments that provided the data base for the study have been described in previous chapters. The various kinds of analyses will be discussed in the chapters that follow. The focus of this chapter will be to describe how the data were organized for analysis, how the data were analyzed and what the combinations of variables analyzed include and represent. The major questions that will be addressed are:

1. From whom were the data gathered?
2. How were the data organized into domains of variables and what do the domains represent?
3. How were the data analyzed?

The Sample

Characteristics of the Districts

Originally it had been planned to draw a random sample of teachers. There were three reasons why this could not be done: (1) some teachers would not participate in a study in which they would be observed and their students' learning measured; (2) there were districts in which contracts were in dispute; (3) the sheer cost of sampling teachers across the state of California would have been prohibitive. It was decided to begin by selecting a set of 30 districts which differed in location and other characteristics. These 30 districts were thought to be sufficient to produce a

sample of eight districts that differed in terms of whether they were urban, suburban or rural districts and were located in different parts of the state.

An urban district was a large metropolitan area such as Los Angeles, San Jose, San Diego, or Sacramento. The population of these school systems and their communities is "large." A suburban district was defined as one that served an urban area by providing its work force. A rural district was an area which depended on an agricultural economy. Districts in the state were sorted into these categories and by their location in northern or sourthern California. Suburban and rural districts were classified in terms of size and resources. The resulting matrix was defined by the dimensions: (1) urban, suburban, rural; (2) size of district; and, (3) fiscal resources.

	SOUTH			NORTH		
	LARGE	MEDIUM	SMALL	LARGE	MEDIUM	SMALL
URBAN	Los Angeles			San Jose		
SUBURBAN	Riverside		San Marino			Orinda
RURAL			Barstow		Vacaville Elk Grove	

Two other constraints were placed on the districts which were placed in these cells. There was no ongoing dispute over the teachers' contract. The achievement scores in the district were not markedly low or had not been dropping for several years. We

assumed that if the test scores had been dropping for several years, social changes might be occurring in the districts, or districts might have unusual characteristics not apparent in the available data. The state also provides an analysis of district scores by their location with respect to a regression line computed for all districts. We did not include in the matrix any district whose scores were markedly below this regression line on the grounds that conditions there might be unusual in ways we could not measure.

It should be remembered that the purpose of this study was first and foremost to study the relations between teaching and learning. It was not to describe differences among teachers and pupils in the state of California. For this purpose it is sufficient to have a sample of teachers in which such relations may be found. Since no one knows how to select such a sample in advance, we assumed that by selecting urban, suburban, and rural districts, large and small, "rich" and "poor," we would be likely to obtain a sample of teachers who differed sufficiently in their teaching for the purposes of this study.

How did these procedures for selecting a sample of districts affect the conclusions to be drawn from this study? As the data in Volume II indicate, there is sufficient range in the characteristics of the districts to provide a range of school and pupil characteristics. The pupils and their communities vary considerably in socioeconomic status, for example. As far as we can tell

there is sufficient variability in the sample for the purposes of this study.

The Evaluation of Teaching Committee of the California Commission for Teacher Preparation and Licensing and Educational Testing Service staff prepared this matrix of 30 districts. The Executive Secretary of the Commission contacted each of the 30 selected district superintendents to invite their participation. Eight districts agreed to participate. The initial recruiting meetings were held in each district. The districts are described in terms of the matrix in the figure.

Characteristics of the Teachers

A total of 95 teachers from the eight districts participated in the entire study on a voluntary basis. Forty-one second-grade teachers and 54 fifth-grade teachers were in this group. There were 97 participating teachers in the study in the fall. However, two teachers were assigned to other duties and could not continue in the study. The figures below are based on information collected in the fall teacher questionnaire and include these two teachers.

The teachers in the project had from three to 31 years of full-time teaching experience, with an average of 13.4 years of experience. They had spent from one to 18 of these years teaching at the school site represented in the study.

Forty of the second-grade teachers were female and two were male. There were 38 female teachers and 17 males teachers at grade

five. The teachers ranged in age from 24 to 60 years with the average age of the female teachers being 40.2 years and for the male teachers 41.3 years. The group of 97 teachers had nine Blacks, one Chinese-American, four Japanese-Americans, and 83 Caucasians.

Characteristics of the Pupils

There were about 2700 pupils in the 95 participating classrooms. Almost 1100 of these were in grades 1 through 3 and about 1600 in 4 through 6. An original intent in the study was to have self-contained, single-grade classrooms. But it was necessary to include other kinds of classroom configurations, such as those composed of pupils at adjacent grade levels. The approximate percent of pupils in each grade is shown in the following table. Pupils in multi-graded classrooms were treated in the analyses as second or fifth-grade pupils.

Table 6.1

Number and Percent of BTES Pupils at Each Grade Level

Grade	Number	Percent
1	75	3
2	864	33
3	117	4
4	70	3
5	1394	52
6	138	5

The Phase II classrooms had a higher proportion of minority pupils than the districts or the state as a whole. English was a second language for about 12 percent of the pupils. Two-thirds of those spoke Spanish and the remainder another language.

The sample included a fairly broad spectrum of districts, teachers and students, but it was not the purpose to estimate the parameters of a population. Because the teachers were to be a volunteer sample, it was not intended nor was it possible to select a random sample. The purpose of the study is to try to describe teaching performances that are related to pupil learning; in order to achieve this goal a broad sample of teachers whose students would differ in their patterns of growth in reading and mathematics achievement was needed. Then the characteristics and performances of the teachers whose pupils showed the least gains could be compared to the characteristics and performances of teachers whose pupils showed the most gains. That the sample afforded those kinds of comparisons will be illustrated in the chapters that follow.

A technical discussion of how the data were organized within and across domains of variables and how the data were analyzed will be followed by a description of each domain.

Data Organization

Transformation of Variables

Sixty variables in reading and fifty-nine variables in mathematics were defined. The list of variables appears on pages 10-13, the

descriptions and sources of the data in the various domains of variables appear in the rest of the chapter. The correlation matrix of the scores was used in the regression analyses and the path analyses described later in this volume.

It was desired to reduce the number of scores and still use all the information from all the data items. This was accomplished by constructing new scores which were sums of the original standardized scores. The original standardized scores were calculated by subtracting the mean from each original score and dividing the resulting difference by the standard deviation. The new scores were then standardized and their correlation matrix computed. The methods used in these calculations are described below. Although ultimate interest is in the new scores, for technical reasons the calculations were applied to the correlation matrix of original scores.

In matrix notation,

Let C represent the $N \times N$ correlation matrix of all data items to be combined for the various scores

$$C = \begin{pmatrix} 1 & C_{12} & \cdots\cdots & C_{1N} \\ C_{21} & 1 & \cdots\cdots & C_{2N} \\ \vdots & \vdots & & \vdots \\ C_{N1} & C_{N2} & \cdots\cdots & 1 \end{pmatrix}$$

where N is the number of original scores being used.

Now,

Let T represent an N x I transformation matrix indicating which data items are to be summed to form I variable scores. This transformation will be applied to C.

$$T = \begin{array}{c} \begin{matrix} 1 & 2 & \cdots\cdots & I \end{matrix} \\ \begin{pmatrix} 1 & 0 & \cdots\cdots & 0 \\ 1 & 0 & \cdots\cdots & \cdot \\ 0 & 0 & \cdots\cdots & \cdot \\ \vdots & \vdots & & \vdots \\ \vdots & 1 & & \vdots \\ \vdots & 1 & & \vdots \\ \vdots & \vdots & & \vdots \\ 0 & 0 & \cdots\cdots & 1 \end{pmatrix} \begin{matrix} 1 \\ 2 \\ 3 \\ \vdots \\ \vdots \\ \vdots \\ \vdots \\ N \end{matrix} \end{array}$$

where 1 in row i, column j and 1 in row i + 1, column j indicates the summing of the correlations of the data items in rows i and i + 1 to form variable j.

Therefore,

K = T' C T is the resultant I x I matrix.

For example if T contains a 1 in row 1 column 1 and in row 2 column 1, the resultant matrix is

$$K = \begin{pmatrix} 1+C_{12}+1+C_{21} & \cdots\cdots & C_{1N}+C_{2N} \\ \vdots & & \vdots \\ C_{N1}+C_{N2} & \cdots\cdots & C_{NN} \end{pmatrix}$$

$$= \begin{pmatrix} K_{11} & \cdots\cdots & K_{1I} \\ K_{21} & \cdots\cdots & K_{2I} \\ \vdots & & \vdots \\ K_{I1} & \cdots\cdots & K_{II} \end{pmatrix}$$

The $I \times I$ correlation matrix $\hat{C}$ used in the analyses is obtained by transforming K so that unity appears in the diagonal and correlations appear off the diagonal.

That is,

$$\hat{C} = \begin{pmatrix} 1 & \hat{C}_{12} & \cdots & \hat{C}_{1I} \\ \hat{C}_{21} & 1 & \cdots & \hat{C}_{2I} \\ \vdots & & & \vdots \\ \hat{C}_{I1} & \cdots & & 1 \end{pmatrix}$$

$$\text{where } C_{ij} = \frac{K_{ij}}{\sqrt{K_{ii}}\ \sqrt{K_{jj}}}$$

if $K_{ij} \neq 0$.

$$C_{ij} = 0 \quad \text{if} \quad K_{ij} = 0$$

$i = 1,\ldots,I$
$j = 1,\ldots I$

Note that if X is a vector of original scores; then writing the transformation

$$Y = X\,T$$

where T is as defined above, gives the new vector Y whose components are sums of the standardized original scores. These new scores will have mean zero. The division of each of the new scores by its standard deviation gives a normalized score. These are then the scores that would give the new correlation matrix computed previously.

Path Analysis Notation

Figure 6.1 represents the path analysis model. Notice that each major category in the figure has been assigned a cell number.[1]

Each cell is represented by a vector

$$X_{\ell} = \begin{pmatrix} X_{\ell 1} \\ \vdots \\ X_{\ell m} \end{pmatrix}$$

where ℓ is the number of the cell and where $X_{\ell,j}$ is the jth component of the vector X_{ℓ}. The notation

$$[\ell \rightarrow k]$$

indicates that in the path analysis the vector X_{ℓ} occurs prior to the vector X_k and the notation

$$[\ell \leftrightarrow k]$$

indicates that there is no priority for the occurrence of the vectors X_{ℓ} and X_k.

For notational convenience in describing the relation $[\ell \rightarrow k]$,

$$X_k = A_{\ell \rightarrow k} X_{\ell}$$

indicates that $A_{\ell \rightarrow k}$ is a matrix, with n rows and m columns which contains the elements $a_{k,i;\ell,j}$ in the ith row and jth column and which gives solutions to the system of equations on the components of X_k and X_{ℓ}.

$$X_{k,i} = \sum_{j=1}^{m} a_{k,i;\ell,j} X_{\ell,j} \qquad i = 1,\ldots,n$$

[1] For notational convenience, cells 13 and 14 shall be referred to as cell 13 in the following equations. Cells 7a and 7b will be referred to as cell 7. Cells 9a and 9b will be referred to as cell 9.

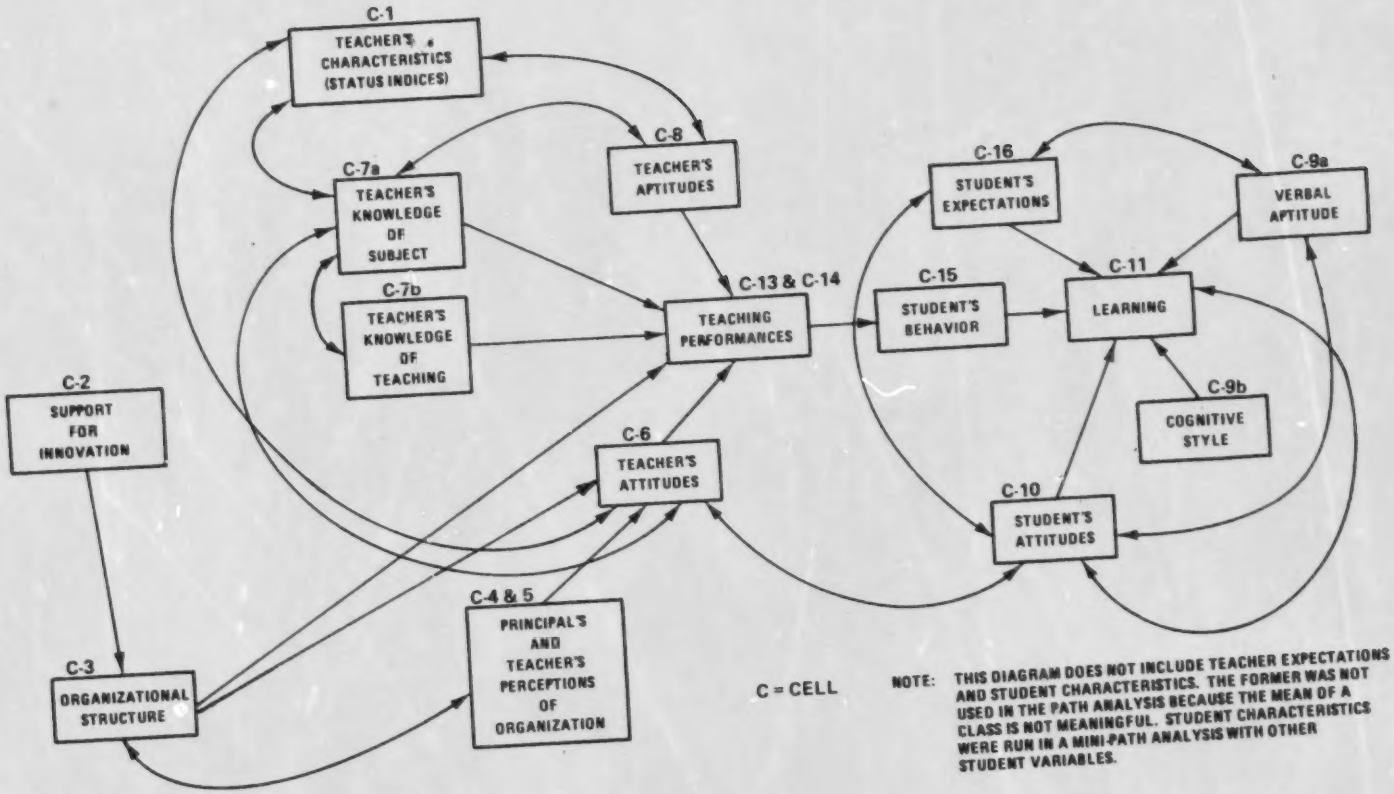

Figure 6.1. A Structural Model of the Domain of Variables Influencing Teaching Performances and Children's Learning

Definition of Path Analysis Variables

Before delineating the path analysis equations that were solved, the cells and the variables which will appear in the equations are listed:

Cell 1 X_1: Teacher Characteristics

$X_{1,1}$: Sex

$X_{1,2}$: Age

$X_{1,3}$: Years at school

$X_{1,4}$: Years teaching

$X_{1,5}$: Educational level

Cell 2 X_2: Support for Innovation

$X_{2,1}$: Number of extra teachers and aides

$X_{2,2}$: Total amount of district funds received

$X_{2,3}$: Principal stimulates change

Cell 3 X_3: Organizational Structure

$X_{3,1}$: Instructional complexity

$X_{3,2}$: Degree of teaming

$X_{3,3}$: Student consensus factor

$X_{3,4}$: Centralization of decision-making

$X_{3,5}$: Principal help

Cell 4 X_4: Principal's Perceptions of Organization

$X_{4,1}$: Superintendent's administrative style

$X_{4,2}$: Principal's (perceived) administrative style

Cell 5 X_5: Teacher's Perceptions of Organization

$X_{5,1}$: Principal's administrative style

$X_{5,2}$: Class climate

Cell 6 X_6: Teacher's Attitudes

$X_{6,1}$: Aspirations

$X_{6,2}$: Satisfaction

$X_{6,3}$: Teacher's perception of student characteristics

Cell 7 X_7: Teacher's Knowledge of Subject and of Teaching

$X_{7,1}$: Teaching knowledge, reading

$X_{7,2}$: Teaching knowledge, mathematics

$X_{7,3}$: Subject knowledge, reading

$X_{7,4}$: Subject knowledge, mathematics

Cell 8 X_8: Teacher's Aptitudes

$X_{8,1}$: Verbal fluency

$X_{8,2}$: Memory

$X_{8,3}$: Reasoning

$X_{8,4}$: Flexibility

$X_{8,5}$: Cognitive style

Cell 9 X_9: Student Aptitude

$X_{9,1}$: Verbal aptitude

$X_{9,2}$: Cognitive style

Cell 10 X_{10}: Students' Attitudes

$X_{10,1}$: Fall attitude toward reading and mathematics

$X_{10,2}$: Spring attitude toward reading and mathematics

Cell 11 X_{11}: Student Learning

$X_{11,1}$: Gain score CAT Reading Comprehension

$X_{11,2}$: Gain score Reading Application (ETS)

$X_{11,3}$: Gain score Decoding

$X_{11,4}$: Gain score Reading Achievement (ETS)

$X_{11,5}$: Gain score Reading Total

$X_{11,6}$: Gain score CAT Mathematics Concepts

$X_{11,7}$: Gain score CAT Mathematics Computation

$X_{11,8}$: Gain score Mathematics Applications

$X_{11,9}$: Gain score Mathematics Total

Cell 13 X_{13}: Teaching Performances

$X_{13,1}$: WD-1

$X_{13,2}$: WD-2

$X_{13,3}$: WD-3

$X_{13,4}$: WD-4

$X_{13,5}$: WD-5

$X_{13,6}$: APPLE 5

$X_{13,7}$: APPLE 6

$X_{13,8}$: APPLE 7

$X_{13,9}$: APPLE 8

$X_{13,10}$: APPLE 9

$X_{13,11}$: APPLE 10

$X_{13,12}$: APPLE 11

$X_{13,13}$: APPLE 12

$X_{13,14}$: APPLE 13

$X_{13,15}$: APPLE 14

$X_{13,16}$: RAMOS 1

$X_{13,17}$: RAMOS 2

$X_{13,18}$: RAMOS 3

$X_{13,19}$: RAMOS 4

Cell 15 X_{15}: Students' Behavior

$X_{15,1}$: APPLE 1

$X_{15,2}$: APPLE 2

$X_{15,3}$: APPLE 3

Cell 16 $\bar{X}_{16}$: Students' Expectations

$X_{16,1}$: Students' expectations mathematics

$X_{16,2}$: Students' expectations reading

Path Analysis Equations

The pages that follow give the path analysis equations that were solved.

(1) [1↔8]

$$X_8 = A_{1\leftrightarrow 8} X_1$$

$$X_{8,i} = \sum_{j=1}^{5} a_{8,i;1,j} X_{1,j} \qquad i = 1,\ldots,5$$

(2) [8→13]

$$X_{13} = A_{8\to 13}\, X_8$$

$$X_{13,i} = \sum_{j=1}^{5} a_{13,i;8,j}\, X_{8,j} \qquad i = 1,\ldots,19$$

(3) [2→3]

$$X_3 = A_{2\to 3}\, X_2$$

$$X_{3,i} = \sum_{j=1}^{3} a_{3,i;2,j}\, X_{2,j} \qquad i = 1,\ldots,5$$

(4) [3→13]

$$X_{13} = A_{3\to 13}\, X_3$$

$$X_{13,i} = \sum_{j=1}^{5} a_{13,i;3,j}\, X_{3,j} \qquad i = 1,\ldots,19$$

(5) [3→6]

$$X_6 = A_{3\to 6}\, X_3$$

$$X_{6,i} = \sum_{j=1}^{5} a_{6,i;3,j}\, X_{3,j} \qquad i = 1,2,3$$

(6) [4→6]

$$X_6 = A_{4\to 6}\, X_4$$

$$X_{6,i} = \sum_{j=1}^{2} a_{6,i;4,j}\, X_{4,j} \qquad i = 1,2,3$$

(7) [5→6]

$$X_6 = A_{5\to 6}\, X_5$$

$$X_{6,i} = \sum_{j=1}^{2} a_{6,i;5,j}\, X_{5,j} \qquad i = 1,2,3$$

(8) [6→13]

$$X_{13} = A_{6\to 13}\, X_6$$

$$X_{13,i} = \sum_{j=1}^{3} a_{13,i;6,j}\, X_{6,j} \qquad i = 1,\ldots,19$$

(9) [13→15]

$$X_{15} = A_{13\to 15}\, X_{13}$$

$$X_{13,i} = \sum_{j=1}^{19} a_{15,i;13,j}\, X_{13,j} \qquad i = 1,2,3$$

(10) [15→11]

$$X_{11} = A_{15\to 11}\, X_{15}$$

$$X_{11,i} = \sum_{j=1}^{3} a_{11,i;15,j}\, X_{15,j} \qquad i = 1,\ldots,9$$

(11) [16→11]

$$X_{11} = A_{16\to 11}\, X_{16}$$

$$X_{11,i} = \sum_{j=1}^{2} a_{11,i;16,j}\, X_{16,j} \qquad i = 1,\ldots,9$$

(12) [10→11]

$$X_{11} = A_{10\to 11}\, X_{10}$$

$$X_{11,i} = \sum_{j=1}^{2} a_{11,i;10,j}\, X_{10,j} \qquad i = 1,\ldots,9$$

(13) [9→11]

$$X_{11} = A_{9\to 11}\, X_{9}$$

$$X_{11,i} = \sum_{j=1}^{2} a_{11,i;9,j}\, X_{9,j} \qquad i = 1,\ldots,9$$

(14) [7→13]

$$X_{13} = A_{7\to 13}\, X_{7}$$

$$X_{13,i} = \sum_{j=1}^{4} a_{13,i;7,j}\, X_{7,j} \qquad i = 1,\ldots,19$$

Methods of Data Analyses

The methods used for analysis were at several levels: (1) analysis of items by instrument; (2) analysis of instrument over teachers and students; (3) analysis of change in class achievement from fall to spring; and (4) analysis of the relation between achievement, student characteristics, teacher characteristics and teacher behavior. We shall describe the methods for each type of analysis in order. Since, with two exceptions, all of the methods are standard, we will simply mention the methods. The two exceptions we shall describe briefly when their use is discussed.

The analysis of item by instruments used standard programs for determining: (1) the frequency with which items were answered correctly; (2) the relation of an item to other items in the test; and (3) the relation of the item to test score; and, (4) item reliability. These were done by taking: (1) frequency counts of items answered correctly, answered incorrectly and items not answered; (2) point biserial correlations between answers on different items; (3) correlations between an item and test score minus that item; and, (4) calculation of the Kuder-Richardson reliability index.

These item-by-instrument analyses were done for most of the paper-and-pencil tests given to pupils and teachers. The major exception was the teacher tests which involve divergent production for which traditional item analysis techniques are not appropriate. Most of these tests are included in the teacher flexibility factor. The

first step, the frequency with which items were answered correctly, was varied slightly for the measures of pupil achievement in reading and mathematics. The achievement test battery, which the pupils took in the fall, was to be administered again in the spring of the school year. The items answered correctly by more than 95 percent of the pupils on the fall reading and mathematics achievement tests were dropped not only from the spring forms of the test, but deleted from the fall scores of participating pupils. Very few items were involved, most of them in the decoding tests. Details of the item-by-instrument analyses can be found in Volume IV of this report.

The analyses of measures over teachers and students were done to see if it was possible to collapse a large number of measures into relatively fewer measures that strongly indicated some named trait. This was generally done by factor analytic techniques. Both "Exploratory" and "Targeted" techniques were used. In some instances a technique for sequentially reducing the size of the space in terms of the original measurements was used as a check on the reduction. The technique is based on "stepdown" regressions. Although the factor analytic techniques were tried with a variety of measures, factor scores were ultimately used in six of the 16 domains of variables. These processes are described in relation to specific data gathering procedures in Volume IV. They were (see Figure 6.1):

Cell 2 - Support for Innovation
Cell 3 - Organizational Structure
Cell 4 - Principal's Perceptions of the Organization
Cell 5 - Teacher's Perceptions of the Organization

Cell 6 - Teacher's Attitudes

Cell 8 - Teacher's Aptitudes (four out of five scores were factor scores; the fifth was cognitive style).

The factors were then utilized in any further analyses.

All classes had their spring achievement scores written as a linear function of the fall achievement scores. This was done for all achievement scores and for what is called "Total Score" for given subject matter and given grades. The result is a linear description of the class's change over the year. The total-score linear relationship was used to roughly classify a class as to "effectiveness of learning experience" relative to other classes. This classification is described in detail in Chapter 8.

The analysis of the relationship between class gains, student characteristics, teacher characteristics and teacher behavior was done by looking at the regressions of class gains on other variables. Class gains were either the mean difference between spring and fall scores or the residual in the spring score when the fall score is used as a concomitant variable. Multiple regressions and stepwise regressions on a fixed number of independent variables were done to determine if a reasonable linear relationship existed between the class gains and the set of independent variables. These analyses are described in Chapter 7.

In order to look at the data in an orderly fashion, linear input-output models were constructed which indicate what characteristics appear to be inputs for other characteristics or acts. These are

referred to in the genetic and educational literature as "Path" models. The paths were represented by a system of linear equations and the coefficients and total paths are calculated. The solutions to the Path equations are given in Chapter 9.

The Domains of Variables

In the sections that follow, each domain of variables will be described in detail. Teaching Performance and Student Behavior will be presented first and will be followed by each of the other domains represented in the model for structural analysis.

CELLS 13 AND 14 | TEACHING PERFORMANCES

Teaching Performance data were gathered from observational records and teacher reports of their activities. The sources were the APPLE and RAMOS records of observed teacher behavior and the several instruments of the Work Diary series provided by teachers.[2] Each "score" or combination of scores used in the domain of variables in the teaching performances portion of the structural model will be described in turn.

APPLE Scores

The first APPLE scores reflect instructional contexts. An instructional context defines the relationship of the teacher to the

[2] See Volume III, Chapters 1 and 2 for complete descriptions of the APPLE and RAMOS observational systems; Volume V, Chapter 5 for a detailed description of the teacher reports of activities.

instructional activity of the pupil. There are six major contexts in the system, five of which are represented by scores in the teaching performance domain of variables. The sixth, Adult-Group, was not used in this analysis. The APPLE Lexicon definitions of Instructional contexts are shown in Figure 6.2 reproduced from Chapter 1 of Volume III. The scores represent the prorated frequencies of the observations of target pupils in each instructional context. The APPLE context scores can be thought of as an index of the proportion of time pupils spent in each context (see Chapter 4 for a full discussion of APPLE variables). In APPLE-Six (teacher group), for example, the total number of observations of a teacher leading a group including a target pupil during reading or mathematics instructional activities was prorated with respect to the total number of observations over all of the observation days in a single classroom. A "high score" in the APPLE system reflects a more frequently observed context, teacher activity, teacher response or pupil event.

Where two or more APPLE "scores" have been combined to create one of the categories described below, all of the inclusions have been listed. The descriptive phrases for each of the combination categories were arrived at by examining the average or mean prorated incidence of each "score" and the standard deviation of the "score." Table 6.2 is an example. As an illustration of that procedure, the descriptive label we have applied to AP-14, a combined category of teacher responses, is "nonresponsive to individual pupil behavior."

Figure 6.2

APPLE Lexicon Definition of Selected Contexts

ADULT-GROUP:	The class is divided into groups and an adult other than teacher is directing the activity of the group in which the child observed is participating.
INDEPENDENT-CLASS:	The entire class is working or playing independently of the teacher's direction. Teacher usually present but not directing.
INDEPENDENT-GROUP:	The group of students in which the child being observed is participating is working or playing independently of the teacher's direction.
INDEPENDENT-INDIVIDUAL:	The student being observed is working or playing independently of the teacher's direction and also independently of the rest of the class.
TEACHER-CLASS:	Teacher is directing the activity and the entire class is participating.
TEACHER-GROUP:	The class is divided into groups and the teacher is directing the activity of the group in which the child being observed is participating.

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Table 6.2

EXAMPLE:

Means and Standard Deviations of the Prorated Incidence of the APPLE-14 Teacher Responses

AP-14 Nonresponsive to Individual Pupil Behavior Encoded AP-14 Teacher Responses	READING				MATHEMATICS			
	Grade 2		Grade 5		Grade 2		Grade 5	
	$\bar{x}$	S.D.	$\bar{x}$	S.D.	$\bar{x}$	S.D.	$\bar{x}$	S.D.
Ignoring	2.04	3.30	1.77	3.03	2.42	3.57	2.79	4.17
Negative Feedback	.47	1.34	.32	1.33	.28	.85	.40	1.03
None	62.12	17.34	66.13	19.00	65.18	16.56	67.90	21.28
Moves On	1.26	2.14	.97	1.67	.34	.79	.45	1.16

The definitions of each response are shown in Figure 6.3. The APPLE teacher responses, ignoring a pupil, moving on to another pupil, no response and mild negative feedback to a pupil, have been grouped together for this category. An examination of Table 6.2 shows that APPLE teacher response "none" makes the largest contribution to a combination score considering the mean and the standard deviation. The "contribution" of each single score can be estimated from these tables by dividing the mean by the standard deviation. The teacher responses "ignoring," "none" and "moves on" in combination exceed the marginal contribution of "negative feedback," a teacher response to pupil performance or behavior. "Nonresponsive to pupil behavior," then, was a descriptively accurate mnemonic to assign to the combination of scores included.

APPLE Instructional Contexts

APPLE-FIVE (AP-5) represents the prorated incidence of pupil activities in a classroom when the pupil is working independently of the teacher or other adults. The child may be working on an individual, group or class assignment (APPLE Independent-Individual, Independent-Group and Independent-Class Contexts). AP-5 may be thought of as an index of the time pupils spent working independently. The three independent work context scores were combined for the analysis. The definition of the APPLE contexts are given in Figure 6.2; the means and standard deviations are shown in Table 6.3.

Figure 6.3

APPLE Lexicon Definition of Selected Teacher Responses

INSTRUCTING:	Teacher activities connected with her traditional jobs of instructing and supervising the everyday business of the classroom - "gave a lesson," directed, organized, "called on pupil," answered a question.
DISCIPLINING:	Punishment imposed on child for his behavior, e.g. sent to principal's office or told to sit in corner or to stay after school.
TEACHER HELP:	Teacher gives some specific instructional assistance to an individual student.
IGNORING:	Teacher seemingly aware but not responding to behavior or performance of pupil.
MOVES ON:	Teacher does not comment on or give feedback to a pupil response, as in a question and answer session; instead, she calls on another pupil or moves on to another part of the lesson. Can occur when pupil's response is correct or incorrect.
NEGATIVE FEEDBACK:	Mild negative verbal reinforcement in response to academic or behavioral performance. e.g., "wrong," "no."
NONE:	No response to pupil performance or behavior. No distinction made between whether teacher aware of this performance or behavior or not (unless is clearly a situation of IGNORING).
POSITIVE FEEDBACK:	Use of mild positive verbal reinforcement in response to academic or behavioral performance. e.g., "right," "O.K.," "good," "fine," "correct."
PRAISE:	Teacher commends or tangibly rewards a student's activities or products.
QUESTIONING:	Teacher responds to pupil's behavior or answer to a previous question by herself asking a question.
RECOGNIZING:	Teacher's neutral nonevaluative response to an academic performance or a nonacademic behavior; e.g., "notices," "acknowledges".
REDIRECTING:	A verbal or non-verbal action by the teacher to redirect a pupil's behavior. Done without apparent anger.

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Table 6.3

Means and Standard Deviations of the Prorated Incidence of the APPLE Independent Contexts

AP-5 INDEPENDENT PUPIL WORK	READING				MATHEMATICS			
	Grade 2		Grade 5		Grade 2		Grade 5	
	$\bar{x}$	S.D.	$\bar{x}$	S.D.	$\bar{x}$	S.D.	$\bar{x}$	S.D.
Class Assignment	7.28	12.21	19.49	25.66	13.06	19.97	27.11	30.37
Group Assignment	28.87	17.44	32.57	21.38	22.41	20.00	22.49	24.81
Individual Assignment	5.08	12.87	3.05	9.63	3.96	11.05	.98	4.23

APPLE-SIX (AP-6) reflects the prorated incidence of group mathematics or reading activities directed by the teacher (APPLE Teacher-Group Context). APPLE-SIX is not a combined category of scores so no table is included. AP-6 is an index of the time pupils spent in group activities with a teacher.

APPLE-SEVEN (AP-7) represents the prorated incidence of the observation of the teacher directing the reading or mathematics activity with the entire class participating (APPLE Teacher-Class Context). AP-7 is an index of the time pupils spent in teacher-led activities that involved the whole class. AP-7 is also not a combined score.

The next four APPLE scores represent teacher activities. Teacher activities are instructional activities of the teacher during reading or mathematics instruction and are teacher behaviors which initiated or accompanied observed pupil activities. The APPLE Lexicon definitions of Teacher Activities are shown in Figure 6.4. The scores represent the prorated incidence of the observations of each teaching activity with the total number of observations over all of the observation days in a single classroom. As is true of all of the APPLE categories used in the analysis, the observations were organized within grade level and instructional activity. Observations associated with classroom activities other than reading and mathematics have not been included in the analysis.

Figure 6.4

APPLE Lexicon Definition of Selected Teacher Activities

ACADEMIC ORGANIZING: Teacher getting class or group organized. Giving directions, explaining and doing other activities which direct the students into activities.

ANSWERING: Teacher answers question(s). May refer to a single answer to a single question or to a general situation where teacher is answering questions put by several students over a period of time.

ASKING: Teacher is asking questions of a single student, a group, or the class.

AT DESK: Teacher is doing work at desk. Used when teacher's activity is unspecified or unknown and/or when she is available to help students at her desk.

AT BOARD: Teacher is working at blackboard, either alone (e.g., writing on board) or with student(s).

CHECKING: Teacher is checking work to see if material is understood, to see if instructions are being followed, to see how well work is being done, or if work is correct.

CIRCULATING: Teacher is circulating around room, interacting with students, asking and answering questions, giving help. Used when a more specific activity cannot be identified or when several activities are happening one after the other too quickly to be specific.

DISCUSSION: Teacher is leading a discussion. Emphasis on student response and comprehension, not simply on facts.

EXPLAINING: Teacher is explaining something, either in response to a question or as part of a process of giving instructions.

HELPING: Teacher is helping a pupil or pupils in unspecified manner. Used when more precise activity, such as explaining or answering, cannot be distinguished, or when several helping activities are happening too quickly to be specified.

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Figure 6.4 (Continued)

INSTRUCTION GIVING:	Teacher is giving instructions either about an assigned activity or about classroom organization.
LISTENING:	Teacher listens to a student, either during oral reading or while student speaks to her or asks a question.
QUESTION AND ANSWER:	Teacher is asking a series of questions, which students answer. Used primarily in group or class context and distinguished from ASKING by serial nature of questions.
SUPERVISING:	General situation where teacher is watching over class or a group. May occasionally ask or answer questions, but general emphasis is on observation rather than interaction with students.
WORKING WITH:	General unspecified instructional activity of working with an individual, a group or the class. Used when no other teaching activity is specified.

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APPLE Teacher Activities

APPLE-EIGHT (AP-8) reflects a variety of teaching activities which might be thought of as the kinds of things teachers do to organize and to maintain the instructional process. It represents the total of the prorated frequencies of the APPLE Categories, Academic Organizing, Helping, Instruction Giving, Supervising and Working With. "Working With," a general and non-specific teaching activity contributes the most weight to a total score in AP-8. The means and standard deviations of each component of the AP-8 score are shown in Table 6.4.

APPLE-NINE (AP-9) reflects three teaching activities which may be thought of as the kinds of things teachers do to monitor the understanding or progress of pupils. They are short-term instructional interactions with pupils. This category represents the total of the prorated frequencies of the APPLE Categories: Answering, Asking, and Checking. Asking and Checking account for most of the AP-9 total score. The means and standard deviations are shown in Table 6.5.

APPLE-TEN (AP-10) reflects several teaching activities which may be thought of as intended to develop pupil understanding of instructional activities. It includes teacher goal-directed, topic-oriented and sustained questioning and answering kinds of interactions with pupils. It includes the APPLE Categories: Discussion, Explaining, Listening and Question and Answer. The means and standard deviations are shown in Table 6.6.

Table 6.4

Means and Standard Deviations of the Prorated Incidence of the APPLE-8 Teacher Activities

AP-8 Organize and Manage Instruction	READING				MATHEMATICS			
	Grade 2		Grade 5		Grade 2		Grade 5	
	$\bar{x}$	S.D.	$\bar{x}$	S.D.	$\bar{x}$	S.D.	$\bar{x}$	S.D.
Academic Organizing	3.05	3.96	2.49	4.93	2.03	3.77	1.65	2.86
Helping	3.64	6.88	3.68	6.62	5.13	9.68	7.38	10.80
Instructing Giving	2.30	3.60	3.38	5.22	2.93	4.40	3.25	8.17
Supervising	1.50	4.66	2.83	6.93	2.69	5.35	2.52	7.58
Working With	46.58	26.96	31.75	25.08	29.37	25.56	22.79	21.71

Table 6.5

Means and Standard Deviations of the Prorated Incidence of the APPLE-9 Teaching Activities

AP-9 Monitor Pupil Progress	READING				MATHEMATICS			
	Grade 2		Grade 5		Grade 2		Grade 5	
	$\bar{x}$	S.D.	$\bar{x}$	S.D.	$\bar{x}$	S.D.	$\bar{x}$	S.D.
Answering	.66	2.84	3.45	10.84*	1.41	6.10	2.83	8.60
Asking	6.46	8.47	4.78	5.78	5.39	8.07	4.12	6.72
Checking	2.62	4.86	4.85	9.97	6.69	11.45	6.98	11.89

Table 6.6

Means and Standard Deviations of the Prorated Incidence of the APPLE-10 Teaching Activities

AP-10 Develop Pupil Understanding	READING				MATHEMATICS			
	Grade 2		Grade 5		Grade 2		Grade 5	
	$\bar{x}$	S.D.	$\bar{x}$	S.D.	$\bar{x}$	S.D.	$\bar{x}$	S.D.
Discussion	1.73	4.75	4.07	8.87	2.40	13.68	.71	1.98
Explaining	.48	1.08	1.42	3.90	2.10	4.53	4.54	11.02
Listening	2.50	3.54	1.70	3.78	.16	.72	.15	.75
Question and Answer	1.42	2.77	4.16	8.90	1.51	5.35	1.68	5.05

APPLE-ELEVEN (AP-11) represents three teaching activities which might be thought of as an index of the mobility of the teacher in the classroom. It includes the APPLE Categories: At Desk, At Board and Circulating. The relevant means and standard deviations are shown in Table 6.7.

APPLE Teacher Responses

The last three combinations of APPLE scores represent teacher responses. Teacher responses are teacher behaviors in response to observed pupil behavior during reading or mathematics instruction. The APPLE Lexicon definitions of Teacher Responses are shown in Figure 6.3, placed here again for the reader's convenience. The scores represent the prorated incidence of the observations of each teacher response with the total number of observations over all of the observation days in a single classroom.

As is true of all of the APPLE Categories, the observations were organized within grade level and instructional activity. Observations associated with classroom activities other than reading and mathematics have not been included in the analysis.

APPLE-TWELVE (AP-12) represents a group of teacher reactions to pupil behavior which might be thought of as an index of a teacher's support for and responsiveness to individual pupils in the classroom. It includes the APPLE Categories: Instructing, Questioning, Positive Feedback, Praise, Teacher Help and Recognizing. All of the responses except Instructing are direct teacher responses to individual pupils. The means and standard deviations are shown in Table 6.8.

Table 6.7

Means and Standard Deviations of the Prorated Incidence of the APPLE-11 Teaching Activities

AP-11 Teacher Mobility	READING				MATHEMATICS			
	Grade 2		Grade 5		Grade 2		Grade 5	
	$\bar{x}$	S.D.	$\bar{x}$	S.D.	$\bar{x}$	S.D.	$\bar{x}$	S.D.
At Board	1.58	6.59	.89	2.57	4.86	9.78	1.62	3.10
At Desk	.40	1.68	5.65	14.21	.45	2.31	5.93	14.59
Circulating	5.12	16.20	7.21	15.21	12.28	23.03	8.23	12.30

Figure 6.3

APPLE Lexicon Definition of Selected Teacher Responses

INSTRUCTING:	Teacher activities connected with her traditional jobs of instructing and supervising the everyday business of the classroom - "gave a lesson," directed, organized, "called on pupil," answered a question.
DISCIPLINING:	Punishment imposed on child for his behavior, e.g. sent to principal's office or told to sit in corner or to stay after school.
TEACHER HELP:	Teacher gives some specific instructional assistance to an individual student.
IGNORING:	Teacher seemingly aware but not responding to behavior or performance of pupil.
MOVES ON:	Teacher does not comment on or give feedback to a pupil response, as in a question and answer session; instead, she calls on another pupil or moves on to another part of the lesson. Can occur when pupil's response is correct or incorrect.
NEGATIVE FEEDBACK:	Mild negative verbal reinforcement in response to academic or behavioral performance. e.g., "wrong," "no."
NONE:	No response to pupil performance or behavior. No distinction made between whether teacher aware of this performance or behavior o. not (unless is clearly a situation of IGNORING).
POSITIVE FEEDBACK:	Use of mild positive verbal reinforcement in response to academic or behavioral performance. e.g., "right," "O.K.," "good," "fine," "correct."
PRAISE:	Teacher commends or tangibly rewards a student's activities or products.
QUESTIONING:	Teacher responds to pupil's behavior or answer to a previous question by herself asking a question.
RECOGNIZING:	Teacher's neutral nonevaluative response to an academic performance or a nonacademic behavior; e.g., "notices," "acknowledges".
REDIRECTING:	A verbal or non-verbal action by the teacher to redirect a pupil's behavior. Done without apparent anger.

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Table 6.8

Means and Standard Deviations of the Prorated Incidence of the APPLE-12 Teacher Responses

	READING				MATHEMATICS			
	Grade 2		Grade 5		Grade 2		Grade 5	
AP-12 Responsive to Individual Pupils	$\bar{x}$	S.D.	$\bar{x}$	S.D.	$\bar{x}$	S.D.	$\bar{x}$	S.D.
Instructing	4.04	4.36	3.11	4.85	3.86	4.85	3.26	3.95
Questioning	2.46	1.73	1.04	1.96	1.66	5.61	.55	1.25
Positive Feedback	7.05	5.93	6.01	7.02	6.20	7.62	3.71	4.77
Praise	3.15	3.81	2.14	3.36	2.35	3.83	1.22	2.26
Teacher Help	2.32	2.07	1.78	2.49	3.34	3.70	2.54	3.59
Recognizing	1.66	2.00	2.80	3.89	2.41	3.78	2.94	5.13

APPLE-THIRTEEN (AP-13) represents teacher's responsiveness to inappropriate pupil behavior in ways intended to control or redirect that behavior. It may be thought of as an index of social control during instructional activities. It includes APPLE Categories Disciplining and Redirecting and is weighted with redirecting responses. The means and standard deviations are shown in Table 6.9.

APPLE-FOURTEEN (AP-14) represents teacher responses which may be thought of as an index of a teacher's nonresponsiveness to individual pupils in the classroom. It includes the APPLE Categories Ignoring, Negative Feedback, None and Moves On and it is weighted with None (no response). The means and standard deviations are shown in Table 6.10.

RAMOS Scores

The next four combination scores used in the "Teaching Performance" domain of variables were derived from RAMOS observations. The basic unit of analysis for the RAMOS dat is the student minute, or the number of minutes falling within each of the RAMOS codes and categories of activities. For example, the first combination of RAMOS scores is a category called "Role." All target student minutes spent while the teacher was coded as Instructing, Facilitating, Disciplining, Managing, Assessing, Evaluating for Mastery, Preparing, Supervising Staff or as involved in Independent work were calculated. Student minutes in each code and category were converted to the

Table 6.9

Means and Standard Deviations of the Prorated Incidence of the APPLE-13 Teacher Responses

	READING				MATHEMATICS			
	Grade 2		Grade 5		Grade 2		Grade 5	
	$\bar{x}$	S.D.	$\bar{x}$	S.D.	$\bar{x}$	S.D.	$\bar{x}$	S.D.
AP-13 Control of Pupil Behavior								
Disciplining	1.86	3.35	.83	1.71	1.42	2.48	1.14	2.13
Redirecting	3.47	3.27	3.08	3.79	3.34	3.85	1.91	2.42

Table 6.10

Means and Standard Deviations of the Prorated Incidence of the APPLE-14 Teacher Responses

	READING				MATHEMATICS			
	Grade 2		Grade 5		Grade 2		Grade 5	
	$\bar{x}$	S.D.	$\bar{x}$	S.D.	$\bar{x}$	S.D.	$\bar{x}$	S.D.
AP-14 Nonresponsive to Individual Pupil Behavior								
Ignoring	2.04	3.30	1.77	3.03	2.42	3.57	2.79	4.17
Negative Feedback	.47	1.34	.32	1.33	.28	.85	.40	1.03
None	62.12	17.34	66.13	19.00	65.18	16.56	67.90	21.28
Moves On	1.26	2.14	.97	1.67	.34	.79	.45	1.16

percentage of the total observational time in a single classroom that they represented. The average percentage of student minutes for a code within a subject matter was normalized on the total number of student minutes for that subject matter. A "high score" in the RAMOS system reflects a greater percentage of student time spent within a given code or category.

Where several RAMOS "scores" have been combined to create one of the categories described below, all of the inclusions have been listed. The descriptive phrases for each of the combination categories were arrived at by examining the average or mean of each student minute "score" and the standard deviation of the "score."

RAMOS-ONE (R-1) represents the proportion of student time spent while the teacher assumed a variety of instructional roles. The RAMOS categories included are Instruction, Facilitation, Discipline, Management of Class, Assessment/Diagnosis, Evaluation for Mastery, Preparation, Supervision of Staff and Independent (definitions as shown in Figure 6.5 reproduced from Volume III, Chapter 2). The scores for RAMOS codes Preparation, Supervision and Independent make very modest contributions to the total category score. An examination of the average percentages for a given RAMOS code within a subject matter suggested that the two single codes Instruction and Facilitating make the largest contribution to a R-1 score (Volume III, Chapter 2). A high R-1 score

Figure 6.5

RAMOS Definitions of the Role Functions of an Instructor in a Classroom

Role

This code describes the function of an instructor in a classroom.

INSTRUCTION: The instructor is involved in direct instruction. The code applied to activities in which the instructor is maintaining direct control over learning activity. Direct instruction does not inlcude introduction to an instructional activity, situations where students are working independently with occasional support from the instructor, nor the preparation of instructional materials. Examples of direct instruction might include student recitation under the direct supervision of a teacher, and a situation where a teacher shows a student how to follow instructions in a math workbook. It should also be used for a teacher-led activity where the instructional purpose is not clear, but no other category (e.g., discipline or assessment) is appropriate.

FACILITATION: Activities in which the students work independently, but the instructor provides advice and feedback at the student's request or as a result of the instructor's direct observation.

DISCIPLINE: The instructor's primary activity is to prevent a child (or children) from initiating or continuing undesirable activities. The code should be used only when undesired behavior has occurred or appears imminent; it does not apply to a general discussion of misconduct.

MANAGEMENT OF CLASS: Activities intended to organize the class for some purpose. This code would be used for instructions, for transitional activities, for class meetings, and any discussion or presentation of organizational practices for class work.

ASSESSMENT/ DIAGNOSIS: Formal or informal testing of the knowledge or skills of the students, individually or as a group, so that instruction can be properly prescribed.

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Figure 6.5 (Continued)

EVALUATION FOR MASTERY:	Formal or informal testing of individuals or groups to determine the level of competence or mastery. This category is differentiated from the assessment/ diagnosis code, in that the purpose is not for planning instruction, but instead is designed to determine the child's level of knowledge or competence. Most mandated testing, such as standardized achievement testing for porgram purposes, would be included in this category. The information would generally not be used in any instructional decisions at the classroom level, but would be of interest to the district, the school, or parents. The code applies when the instruction is used to determine if the student's or class's performance meets the teacher's expectations.
PREPARATION:	Activities involving planning lessons, collecting and organizing instructional materials, for immediate or future use. The instructor has minimal interaction with the class, unless students are assisting with that preparation.
SUPERVISION OF STAFF:	A situation where the instructor directs, trains, or observes another instructor, aide, or tutor.
INDEPENDENT:	Students are working independently, with negligible support from any instructor.

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reflects a greater proportion of pupil time spent while a target teacher (the main instructor in RAMOS) was involved in direct instructional and facilitation roles. R-1 is an index of actual teaching time and support time provided to pupils by the teacher. The means and standard deviations are shown in Table 6.11.

RAMOS-TWO (R-2) reflects a variety of aims or purposes of instruction. Those aims are shown in the proportion of time pupils spend in activities used by the teachers to introduce, review or practice facts, skills or concepts. It includes the RAMOS code scores for New Concept, New Fact, Practice Facts, Practice Skills, Review Concept, Review Skill and Review Facts. The average percentages for a given RAMOS code within a subject matter suggested that the single code, Practice Skills, accounts for the largest proportion of the AIM score. R-1 is an index of the time pupils spent acquiring and practicing skills. (See the percentages of single codes in Volume III, Chapter 2.) Definitions are shown in Figure 6.6. The means and standard deviations are shown in Table 6.12.

RAMOS-THREE (R-3) reflects the proportion of time pupils were using a variety of materials during reading and mathematics instruction. It includes the RAMOS codes: Book, Chart/Chalkboard, Workbook, Paper/Pencil, and Equipment. The definitions are shown in Figure 6.7. The RAMOS material scores essentially reflect greater usage of books, workbook and paper and pencils. The means and standard deviations are shown in Table 6.13.

Table 6.11

Means and Standard Deviations of the Percentage of Pupil Time Spent While the Teacher Assumed a Variety of Instructional Roles: RAMOS-1

R-1 Teaching and Support Time	READING				MATHEMATICS			
	Grade 2		Grade 5		Grade 2		Grade 5	
	$\bar{x}$	S.D.	$\bar{x}$	S.D.	$\bar{x}$	S.D.	$\bar{x}$	S.D.
Instruction, Assess/ Diagnose and Evaluate	23.7	16.4	17.1	13.3	11.2	9.8	8.8	8.8
Facilitating, Discipline, and Managing	12.1	10.3	20.1	13.1	8.2	9.2	14.1	11.2
Preparation and Staff Supervision	1.2	4.0	2.3	4.9	0.9	4.1	0.3	1.0
Independent	1.6	3.3	1.8	3.2	0.2	0.7	0.1	0.6

Figure 6.6

RAMOS Definitions of the Aims of an Instructor in a Classroom

AIMS

This field is used to represent the primary purpose of the instructional activities, as perceived by the observer. Determining the proper code for this category requires that the observer make use of whatever cues are available in the classroom. A conversation with the instructor before or after the observation will often be of some help. This is a two-letter field. The initial letter designates whether new material is being introduced, as opposed to skill, practice or review, or application to a practical situation. The second letter designates the level of instruction, ranging from general concepts to specific facts.

NEW: The material or ideas are largely new to the students. If the new material is introduced by a reference to previously taught material, then N code would still be used.

PRACTICE: The student works through an example of previously introduced materials, or engages in other activities designed to promote mastery.

REVIEW: Previously introduced and practiced materials are presented briefly for the purposes of assessment. This category would not be used if there is intensive practice on the material.

CONCEPT: The main focus is on the conceptual basis of a subject matter area. It includes teaching principles, rules, and other general or abstract relations.

SKILL: Activities in which the emphasis is on simply using a skill rather than understanding or knowing. For instance, carrying out addition or subtraction computations would be included here. Rote memorization of the number table would be coded as F (below).

FACT: The emphasis is on acquiring basic knowledge of a relatively simple sort. Examples include learning the addition and multiplication tables, learning simple letter-sound relations, or learning the geographic characteristics of a state, a country, etc.

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Table 6.12

Means and Standard Deviations of the Percentage of Pupil Time Spent in Teaching Activities Reflecting a Variety of Instructional Aims: RAMOS-2

R-2 Pupil Skill Practice Time	READING				MATHEMATICS			
	Grade 2		Grade 5		Grade 2		Grade 5	
	$\bar{x}$	S.D.	$\bar{x}$	S.D.	$\bar{x}$	S.D.	$\bar{x}$	S.D.
New Concept and New Fact	1.9	3.6	3,5	7.9	1.0	2.7	0.8	2.4
Practice Facts and Practice Skills	27.4	13.7	26.9	17.4	12.2	9.2	15.0	11.0
Review Concepts, Skills and Facts	7.0	9.9	5.3	6.7	4.8	7.0	4.5	6.9

Figure 6.7

RAMOS Definitions of the Materials Used in Connection with Instructional Activities

MATERIALS

Materials and equipment used in connection with instructional activities are coded in this field. In addition to the standard materials (books and work sheets) audio-visual equipment and games should be indicated. A column is provided for main material and second material.

BOOK:	Basic textbooks as well as any other books.
CHART/CHALKBOARD:	Charts, chalkboards (hand-held or stationary), flannel boards, or wall displays.
WORKBOOK:	State-adopted workbooks, other workbooks, dittoed handouts, and any other printed material in which the child works on assigned material.
PAPER/PENCIL:	Instances where the child is given writing material to use except for those covered under workbooks. This includes blank paper, pencils, felt marking pens, crayons, etc.
EQUIPMENT:	All items used for demonstration rather than being directly manipulated. Tape recorders, audio-visual equipment, and computer terminals are included under this code.

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Table 6.13

Means and Standard Deviations of the Percentage of Time Pupils Spent Using Variety of Materials: RAMOS-3

R-3 Variety of Materials	READING				MATHEMATICS			
	Grade 2		Grade 5		Grade 2		Grade 5	
	$\bar{x}$	S.D.	$\bar{x}$	S.D.	$\bar{x}$	S.D.	$\bar{x}$	S.D.
Main Materials: Book, Workbook, Paper/Pencil	34.7	17.0	41.0	14.0	12.6	9.8	18.4	10.3
Chart/Blackboard and Equipment	4.7	8.7	2.9	4.7	5.3	6.0	3.9	5.0
Second Materials: Book, Workbook, Paper/Pencil	14.2	10.2	22.1	14.9	5.4	6.2	13.4	11.2
Chart/Blackboard and Equipment	3.3	5.9	1.4	3.3	4.0	7.0	2.5	4.4

Notice the division into two types of materials. If a pupil is reading a book, it is coded as the "Main material." If a pupil is reading a book and taking notes from the book, the book would be encoded as "Main material" and the paper and pencil as "Second material." R-3 may best be thought of as an index of the variety of materials used by pupils in instructional activities.

RAMOS-FOUR (R-4) reflects the proportion of student time spent in various activities. The code Seatwork is the largest single contributor to the score; R-4 can be thought of as an index of the time pupils spend in seatwork. R-4 includes the RAMOS codes Lecture, Discussion, Seatwork, Recital, Question/Answer, Audio-Visual, Game and Visual Demonstration. The definitions of RAMOS activities are shown in Figure 6.8. The means and standard deviations are shown in Table 6.14.

WORK DIARY Scores

The last of the "Teaching Performance" domain variables were the Work Diary scores. Scores were aggregated from the several instruments teachers used to describe their instructional activities. The data were provided from five instruments.

1. The Reading Program Overview was intended to provide a summary of a teacher's reading program for the entire school year. It was completed once by teachers.

Figure 6.8

RAMOS Definitions of Activities in a Classroom

This field describes the situation by which instruction is conducted. Generally, the instructor will have a major role in determining what kind of activity or pattern of activities exist in a classroom.

LECTURE:	The instructor or one or more students is making a direct presentation, either by speaking or by speaking while demonstrating. This code is used if an instructor is giving general instructions, is carrying the large bulk of the talking.
DISCUSSION:	Relatively free interchange of conversation among or between a group, including teachers or students. This code should be used when the conversation is relatively undirected. Other codes should be used for directed question-answer interchanges. It is not essential that everyone in the group enter the discussion, but it should be possible for anyone who wants to.
SEATWORK:	Students are assigned to their seats or work areas, and are told to work individually or in small groups on assigned or free-choice projects. Students need not necessarily be seated, but should be working independently of the instructor's direction for the most part. The instructor may circulate about, helping individuals.
RECITATION/ READING:	Situations in which a student reads or recites aloud as a direct assignment. This includes group reading in unison, as well as individual recitation. Extemporaneous presentation by students is included.
QUESTION-ANSWER:	Students are given direct questions and are expected to give direct answers. This code is also applicable in the reverse situation, where students are free to raise questions with the instructor. If the observer is uncertain, the D code should be used to describe a discussion with some questions and answers.
AUDIO-VISUAL:	The primary focus is on an audio-visual presentation such as a movie or a record.

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Figure 6.8 (Continued)

GAME:	Situations in which there is an obvious game element, including competition between individuals or by an individual with him/herself (e.g., commercial games: Concentration, free form games, 20 Questions).
VISUAL DEMONSTRATION:	Primarily a visual presentation with the verbal portion of secondary importance.

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Table 6.14

Means and Standard Deviations of the Percentage of Time Pupils Spent in a Variety of Activities: RAMOS-4

R-4 Pupil Seatwork Time	READING				MATHEMATICS			
	Grade 2		Grade 5		Grade 2		Grade 5	
	$\bar{x}$	S.D.	$\bar{x}$	S.D.	$\bar{x}$	S.D.	$\bar{x}$	S.D.
Lecture	0.6	1.4	1.9	5.7	0.0	0.0	0.8	2.1
Discussion	2.9	4.1	5.0	7.2	2.4	4.3	1.6	3.4
Seatwork	20.0	13.1	27.4	14.2	10.8	9.6	15.7	9.7
Recital	4.3	6.4	3.0	4.6	0.1	0.5	0.0	0.0
Question/ Answer	7.0	8.9	4.4	5.4	3.2	4.9	2.9	4.0
Audio-Visual	2.7	8.9	0.5	1.7	0.3	1.7	0.1	0.6
Game	1.2	3.0	0.6	2.3	1.8	3.7	1.1	3.0
Visual Demonstration	0.8	3.0	0.1	0.4	0.7	1.8	0.5	1.6

2. The Reading Work Diary was designed to reflect the instructional process during one school week. The Diary was completed twice.
3. The Mathematics Program Overview was intended to provide a summary of a teacher's mathematics program for the entire school year. It, like the Reading Program Overview, was completed once by the teachers.
4. The Mathematics Work Diary was parallel to the Reading Work Diary and was designed to reflect the instructional process during one school week. The Diary was completed twice at the same time that the Reading Diary was used. Both were completed during two target weeks which were eight calendar weeks apart.
5. The Reading and Mathematics Work Diary for Paraprofessionals and Other Teaching Adults in the Classroom also covered a one-week time period and was intended to describe the functions of adult assistants in the classroom. It was completed twice by each adult assistant in a classroom at the time the Reading and Mathematics Work Diaries were completed by teachers.

The information from the battery was organized to indicate, by grade level and within subject areas, the academic emphasis, the quality of the teaching methodology, the complexity of the organizational structure, and the variety and types of instructional

materials used. The scores reflect different metrics such as time or frequencies. The bases of each combined score will be described. Where two or more scores have been combined to create one of the categories described below all of the inclusions have been listed. As in APPLE and RAMOS combined scores, the descriptive phrases for each of the combination categories were arrived at by examining the average or mean and the standard deviation of each score within a category of scores.

WORK DIARY-ONE (WD-1) represents the time spent preparing for and teaching reading or mathematics in a classroom. Time was reported in minutes spent for one week. Included are the time spent by the teacher in preparation for teaching as well as the total instructional time involved in teaching. Teachers were also asked to report the time they spent teaching specific skills during reading and mathematics instruction. Other teaching adults reported their preparation and teaching time. All inclusions in WD-1 are listed in Tables 6.15 and 6.16.

The time spent teaching special skills essentially reflects an amplification of the total teaching time. The activities of other teaching adults contribute minimally to the score WD-1 which may be thought of as an index of direct teaching time provided by the teacher.

WORK DIARY-TWO (WD-2) represents the frequency that teachers reported for teaching (introducing and reviewing) specific kinds of reading or mathematics skills. Included also are the reported

Table 6.15

Means and Standard Deviations of the Components of the WORK DIARY-1 Combination Scores for Reading

WD-1 Preparation and Teaching Time	Reading			
	Grade 2		Grade 5	
	$\bar{x}$	SD	$\bar{x}$	SD
Teacher Time:				
Preparation	165.1	94.2	134.7	78.4
Total Teaching	306.2	144.0	276.2	129.8
Specific Skills:				
Decoding	90.6	60.3	45.0	37.0
Vocabulary	84.5	59.0	54.7	32.2
Comprehension	106.8	74.2	86.1	45.7
Application	112.7	77.7	87.2	60.3
Other Teaching Adults:				
Preparation	51.4	106.0	26.6	70.7
Teaching	77.6	99.5	51.5	112.0

Table 6.16

Means and Standard Deviations of the Components of the WORK DIARY-1 Combination Scores for Mathematics

WD-1 Preparation and Teaching Time	Mathematics			
	Grade 2		Grade 5	
	$\bar{x}$	SD	$\bar{x}$	SD
Teacher Time:				
Preparation	124.4	86.2	130.1	83.1
Total Teaching	177.2	71.7	207.4	91.1
Specific Skills:				
Problem Type	43.0	32.5	55.2	45.4
Operations	82.1	48.5	89.3	62.7
Special Skills	51.3	39.0	44.4	41.0
Other Teaching Adults:				
Preparation	23.2	47.9	17.6	61.9
Teaching	55.9	80.4	24.9	64.9

frequencies of skills teachers did not plan to teach, and the specific skills taught by other teaching adults. The scores of other teaching adults are percentage figures. All inclusions for WD-2 are shown in Tables 6.17 and 6.18. The scores for the skills taught by a teacher make the largest contribution to WD-2, which may be thought of as an index of the variety of specific skills taught by a teacher.

WORK DIARY-THREE (WD-3) reflects ratings of the quality of teacher responses to open-ended questions asking them to describe the teaching strategies, pupil activities and materials used for the skills they taught during a given week (skills introduced and reviewed). The two ratings from a teacher diary were combined. WD-3 might be thought of as an index of the quality of the teaching methodology, or of the complexity of the conceptualization of the instructional design. The inclusions in WD-3 were the ratings on skills introduced and skills reviewed. The inclusions are shown in Table 6.19.

WORK DIARY-FOUR (WD-4) contains several kinds of information intended to describe the variety of instructional contexts or settings in a classroom. Included are the preferred type or types of classroom organization indicated by the teacher, the percentage of pupils taught exclusively by a teacher, the ratio of adults, including the teacher, to students, and the group or groupings of pupils with whom other teaching adults reported they worked. The scores of other teaching adults are percentage figures.

Table 6.17

Means and Standard Deviations of the Components of WORK DIARY-2 Combination Scores for Reading

WD-2 Variety of Specific Skills Taught	Reading			
	Grade 2		Grade 5	
	$\bar{x}$	SD	$\bar{x}$	SD
Teacher				
Skills Taught:				
Decoding	10.6	2.5	7.8	4.2
Vocabulary	2.4	0.8	1.4	1.1
Comprehension	7.0	2.5	5.5	3.0
Application	9.3	3.4	7.9	4.3
Skills Not Taught:				
Decoding	0.4	0.8	2.5	3.5
Vocabulary	0.3	0.9	1.0	1.2
Comprehension	0.8	1.2	1.0	2.5
Application	1.5	1.7	1.3	2.5
Other Teaching Adults				
Skills Taught				
Decoding	37.6	44.9	17.0	36.3
Vocabulary	29.0	41.7	12.3	32.1
Comprehension	38.0	45.3	15.1	34.5
Application	34.9	44.7	17.9	36.5

Table 6.18

Means and Standard Deviations of the Components of WORK DIARY-2 Combination Scores for Mathematics

WD-2 Variety of Specific Skills Taught	Mathematics			
	Grade 2		Grade 5	
	$\bar{x}$	SD	$\bar{x}$	SD
Teacher				
Skills Taught				
Problem Types	4.3	1.4	3.6	1.8
Operations	2.8	1.2	3.7	1.5
Special Skills	3.1	2.1	2.4	2.2
Skills Not Taught:				
Problem Types	1.0	0.8	1.0	1.3
Operations	1.6	1.1	0.9	1.2
Special Skills	0.9	1.3	0.8	1.1
Other Teaching Adults				
Skills Taught:				
Problem Types	27.2	42.7	11.1	29.9
Operations	7.2	23.4	12.0	30.3
Special Skills	22.2	38.1	7.4	26.2

Table 6.19

Means and Standard Deviations of the Components of the WORK DIARY-3 Combination Scores

WD-3 Conceptualization of the Instructional Design	Reading				Mathematics			
	Grade 2		Grade 5		Grade 2		Grade 5	
Teacher	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD
Skills Introduced	3.8	1.5	3.3	1.7	3.9	1.5	3.9	1.5
Skills Reviewed	3.9	1.4	3.3	1.7	3.6	1.5	3.6	1.6

The inclusions in WD-4 are shown in Table 6.20. The single score, percentage of pupils taught exclusively by the teacher, makes the largest contribution to the WD-4 score. A high score on WD-4, then, suggests that a teacher is doing most of the teaching in a classroom.

WORK DIARY-FIVE (WD-5) reflects the number of different kinds of materials used in the instructional process. It includes only the number used. Means and standard deviations are not shown for this single-score category.

CELL 15 STUDENT BEHAVIOR

Three types of observed pupil behavior were included as combination scores in the "Student Behavior" domain of variables. For all analyses except the structural analysis (Chapter 9), the three category scores were included among the "Teaching Performance" variables. That inclusion allowed the interesting and constant reference of pupil performance in each subject area and grade level analyses as it related to teaching performance. The Student Behavior domain was treated as a separate domain for the structural analysis. The three indices of Student Behavior used were pupil productivity, pupil inattentive behavior and pupil on-task behavior. They were selected from among the pupil events observed with the APPLE system and are prorated frequencies of those events. The APPLE Lexicon definitions of pupil events are shown in Figure 6.9.

Table 6.20

Means and Standard Deviations of the Components of the WORK DIARY-4 Combination Scores

WD-4 Variety of Instructional Contexts	Reading				Mathematics			
	Grade 2		Grade 5		Grade 2		Grade 5	
Teacher:	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD
Organization								
Simultaneous	0.1	0.3	0.1	0.3	0.4	0.5	0.5	0.5
Group-level	0.7	0.5	0.6	0.5	0.3	0.5	0.2	0.4
Group-skill	0.2	0.4	0.2	0.4	0.2	0.4	0.3	0.4
Individualized	0.2	0.4	0.3	0.5	0.3	0.4	0.1	0.3
Other	0.1	0.3	0.2	0.4	0.3	0.4	0.3	0.5
Other Teaching Adults								
Organization								
Individual	39.1	46.1	18.9	37.9	31.5	42.2	12.0	30.3
Small Group	38.9	43.9	22.6	40.7	24.0	39.5	10.2	27.9
Large Group	11.0	27.6	8.5	27.0	5.9	22.0	6.5	23.7
Combination	27.1	41.3	15.1	34.5	16.2	34.3	13.0	32.2
Percent Pupils taught by teachers	64.8	37.3	85.6	29.0	65.8	42.1	84.7	26.7
Percent Adults/Pupils	14.9	14.2	9.5	8.7	11.8	11.3	8.6	13.7

Figure 6.9

APPLE Lexicon Definition of
Selected Pupil Events

+ ACADEMIC PERFORMANCE:	Level of performance in school tasks; response to assignments or lessons. Correct.
+ ATTENTIVENESS:	Act of paying attention to the subject being taught or discussed, as shown through physical orientation, gestures, verbal response. Used only in positive sense and in situation where teacher is instructing or leading lesson.
+ DIRECTION-FOLLOWING:	Behavior related to following directions given by the teacher. Cooperation with teacher directives, whether academic or behavioral.
+ ENGAGEMENT:	Act of being involved in subject of lesson. Used when pupil working independently of teacher.
+ PARTICIPATION:	Description of an act of joining in a general class or group activity.
+ VOLUNTEERING:	Any spontaneous offering by the child to do a job or to give information, as in response to teacher's call for volunteers or to a question put to the entire group or class.
+ WORK HABITS:	Positive manner or method of pursuing tasks, i.e. completion of work, efficiency, organization, neatness.
- CONDUCT:	Negative school behavior which cannot be placed under a more specific event.
- INATTENTION:	Not paying attention to subject being taught or discussed, as shown through orientation, verbal responses, gestures. Usually implies a long-term distraction from activity being directed by teacher.
- TALKING:	Inappropriate or forbidden speaking, such as speaking out of turn or during a quiet period.

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Figure 6.9 (Continued)

0 CONDUCT:	Neutral school behavior which cannot be placed under a more specific event.
0 ENGAGEMENT:	Act of being engaged in subject of lesson, but with less degree of involvement or attention than + ENGAGEMENT.
0 INATTENTION:	Not paying attention to subject being taught or discussed. Usually implies a short-term distraction from activity being directed by teacher.
0 WORK HABITS:	Neutral manner or method of pursuing tasks.
+ ORAL READING:	Positive quality of students reading out loud; fluency, accuracy, expressiveness, pacing, etc.
+ PHONIC SKILLS:	Positive evidence of skill in sounding out new words; knowing the sound connected with letters.
+ READING COMPREHENSION:	Pupil's correct understanding of what he has read.
+ NUMBER CONCEPTS:	Positive knowledge of numbers and number relationships. Includes identification of numerals, counting, skill with fractions, geometrical properties, etc.
- NUMBER CONCEPTS:	Absence of knowledge of numbers and number relationships in comparison with age and class level.
0 NUMBER CONCEPTS:	Partial knowledge of numbers or number relationships (e.g., a concept partly understood) or absence of knowledge of concepts more advanced than required by age or class level.

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APPLE-ONE (AP-1) reflects the observed prorated frequencies in reading of good quality pupil performance in three kinds of reading skills; in mathematics the score essentially reflects partial or positive evidence of skills in number concepts. APPLE observers not only wrote a description of each specific pupil behavior, as they did for teacher activities and responses, but coded each pupil event +, - or 0. The AP-1 inclusions for reading are, "+" phonic skills, "+" oral reading and "+" reading comprehension. The inclusions in AP-1 for mathematics are "+" number concepts, "0" number concepts and "-" number concepts. A child's skill in mathematics was given a "0" code when the pupil demonstrated partial knowledge of numbers or number relationships or a lack of knowledge of concepts more advanced than required by age or class level. A "0" coding in mathematics, then, can be regarded as productive pupil behavior during mathematics instruction.

It can be seen in Table 6.21 that "+" and "0" events constitute the largest proportion of observed pupil performance during mathematics. An examination of the lexicon definitions of those two pupil events determined the AP-1 label for mathematics. AP-1 reflects pupil demonstration of knowledge or understanding of content during reading and mathematics instruction. It is an index of pupil skill productivity during instructional activities.

APPLE-TWO (AP-2) reflects a combination of neutral or negative pupil behaviors. It includes conduct, engagement, inattention, work

Table 6.21

Means and Standard Deviations of the Prorated Incidence of the APPLE-1 Pupil Events

Reading

AP-1 Pupil Productivity	Grade 2		Grade 5	
	$\bar{x}$	SD	$\bar{x}$	SD
+ Oral Reading	6.05	5.10	2.94	3.52
+ Phonic Skill	2.36	3.90	.94	2.47
+ Reading Comprehension	2.41	5.20	1.23	2.17

Mathematics

AP-1 Pupil Productivity	Grade 2		Grade 5	
	$\bar{x}$	SD	$\bar{x}$	SD
+ Number Concepts	13.41	12.47	9.67	8.85
- Number Concepts	3.75	5.44	2.06	3.32
0 Number Concepts	2.85	5.97	1.79	2.54

habits and talking rated as "0" or "-" behaviors by the observers. The ratings of this set of behaviors should be contrasted with the ratings on many of the same behaviors in AP-3. AP-2's components are shown in Table 6.22. AP-2 may be thought of as an index of inattentive pupil behavior during reading and mathematics instruction.

APPLE-THREE (AP-3) reflects a positive combination of pupil behaviors and performances. It includes positively ("+") rated pupil behaviors such as attentiveness, engagement, work habits, direction-following, participation, volunteering and academic performance. A "+" academic performance would be all observed evidence of skill-knowledge during reading, for example, that were not examples of the specific reading skills, oral reading, phonic skills, or reading comprehension. AP-3's components are listed in Table 6.23. AP-3 may be thought of as an index of pupil involvement in the instructional activities, pupil on-task behavior, or attentive pupil behavior.

CELL 1 | TEACHER CHARACTERISTICS (STATUS INDICES)

The sources for the scores in the Teacher Characteristics domain were the spring Teacher School Climate Questionnaire[3] and the fall Teacher Questionnaire. There are five scores, each of which is a coded response to a particular item. More items were originally proposed for inclusion in the domain but were eliminated during preliminary analyses. The five status indices which were retained are:

[3]Developed by the staff of the Environments for Teaching Program, Elizabeth G. Cohen, Program Director. NIE Grant #NE-C-00-3-0062. Stanford University, Stanford, California.

Table 6.22

Means and Standard Deviations of the Prorated Incidence of the APPLE-2 Pupil Events

AP-2 Inattentive Pupil Behavior	Reading				Mathematics			
	Grade 2		Grade 5		Grade 2		Grade 5	
	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD
0 Conduct	1.90	2.39	2.20	2.72	1.61	2.55	1.58	2.54
0 Engagement	2.51	5.61	2.36	4.22	1.60	3.25	1.16	2.63
0 Inattention	1.63	2.67	2.38	5.18	1.63	3.99	2.37	4.92
0 Work Habits	3.18	3.51	3.56	4.73	3.15	4.13	5.05	6.85
- Conduct	1.39	2.39	1.38	2.46	1.19	2.25	1.30	2.43
- Inattention	4.92	5.76	5.03	4.52	4.30	5.15	5.60	5.57
- Talking	2.52	3.38	3.10	3.58	3.01	4.81	4.06	6.28

Table 6.23

Means and Standard Deviations of the Prorated Incidence of APPLE-3 Pupil Events

AP-3 Attentive Pupil Behavior	Reading				Mathematics			
	Grade 2		Grade 5		Grade 2		Grade 5	
	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD
+ Attentiveness	4.72	4.73	6.12	7.41	5.70	7.16	6.41	8.00
+ Direction Following	2.29	3.14	2.57	4.62	2.15	4.66	1.68	3.02
+ Engagement	16.36	10.31	24.98	14.94	11.96	11.31	19.25	14.30
+ Participating	2.18	2.51	2.01	5.33	2.36	6.07	1.16	2.20
+ Volunteering	1.66	2.05	1.86	2.91	2.15	3.16	1.74	2.29
+ Work Habits	5.41	6.99	4.94	5.49	7.57	8.37	5.79	5.01
+ Academic Performance	4.73	4.39	4.83	8.60	.74	2.79	.32	.93

	Item	Codes	Response Options
Score 1.	Sex	1 or 2	Male or Female

(Source: Teacher School Climate Questionnaire - Question 1)

Score 2.	Age	(1)	under 30
		(2)	31-40
		(3)	41-50
		(4)	over 50

(Source: Teacher School Climate Questionnaire - Question 2)

Score 3.	Years you have taught at this school	(1)	1-2
		(2)	3-5
		(3)	6-10
		(4)	11-20
		(5)	over 20

(Source: Teacher School Climate Questionnaire - Question 3)

Score 4.	Years of teaching	(1)	1-2
		(2)	3-5
		(3)	6-10
		(4)	11-20
		(5)	over 20

(Source: Teacher School Climate Questionnaire - Question 4)

Score 5.	Educational level	(1)	Bachelors degree
		(2)	Masters degree
		(3)	Professional/specialist
		(4)	Doctorate

(Source: Teacher Questionnaire - Question 11)

CELL 2 | SUPPORT FOR INNOVATION

The sources for the scores in the Support for Innovation domain of variables were the Principal Questionnaire[4] and the Principal Interview.[4] There are three scores, one of which is the sum of item responses. The

[4]Developed by the staff of the Environments for Teaching Program, Elizabeth G. Cohen, Program Director. NIE Grant #NE-C-00-3-0062. Stanford University, Stanford, California.

other two are coded item responses. The three scores were obtained from factor analyses. The three Support for Innovation scores are:

Score 1. Number of extra teachers and aides. (The score is the sum of responses to questions 1c, 1d, 1e, 1f, 1g, 1h1, 1h2, and 1h3 from the Principal Questionnaire.)

1c. the number of teachers who do not have a regular class.

1d. the number of psychologists

1e. the number of counselors

1f. the number of speech therapists

1g. the number of librarians

1h1. the number of curriculum specialists

1h2. the number of mathematics specialists

1h3. the number of reading specialists

	Item	Code	Response Options
Score 2.	Total amount of district funds received	0-500	Actual dollar amounts were coded to represent the hundreds of dollars received, i.e., 500 as a code represents $50,000

(Source: Principal Questionnaire - Question 14)

Score 3.	Principal stimulates change	(1)	Almost no time
		(2)	.
		(3)	.
		(4)	.
		(5)	A great deal of time

(Source: Principal Interview - Question 14)

CELL 3 | ORGANIZATIONAL STRUCTURE |

The sources for the scores in the Organizational Structure domain were the Teacher School Climate Questionnaire and the fall Pupil Survey. There are five scores, four of which are a sum of standardized scores, and one of which is a sum of percent scores. The five scores were obtained by factor analysis. The items that load on a factor are the items that are summed. More than five scores were originally proposed, but some were eliminated during preliminary analyses. The five Organizational Structure items are:

Score 1. Nine standardized scores were summed for the "Instructional Complexity" score. The items included were:

	Item	Code	Response Options
(a)	The most frequent way your mathematics class is grouped	(1)	Whole class grouped together
		(2)	Two or three groups
		(3)	Four or more groups
		(4)	Students work individually

(Source: Teacher School Climate Questionnaire - Question 13a1)

(b)	The least frequent way your mathematics class is grouped	(1)	Whole class grouped together
		(2)	Two or three groups
		(3)	Four or more groups
		(4)	Students work individually

(Source: Teacher School Climate Questionnaire - Question 13b1)

(c)	The most frequent way your reading class is grouped	(1)	Whole class grouped together
		(2)	Two or three groups
		(3)	Four or more groups
		(4)	Students work individually

(Source: Teacher School Climate Questionnaire - Question 13a2)

	Item	Code	Response Options
(d)	The total number of paid aides and adult volunteers in mathematics instruction	Coded as listed (range 0-12)	

(Source: Teacher School Climate Questionnaire - Question 63a)

(e)	Total number of paid aides and adult volunteers in reading instruction	Coded as listed (range 0-12)	

(Source: Teacher School Climate Questionnaire - Question 63b)

(f)	The total number of paid aides and adult volunteers in social studies instruction	Coded as listed (range 0-12)	

(Source: Teacher School Climate Questionnaire - Question 63c)

(g)	To what degree would you say your instructional program in social studies must be presented in a particular order	(1) (2) (3) (4)	Order very important Order moderately important Order slightly important Order not at all important

(Source: Teacher School Climate Questionnaire - Question 37c)

(h)	In general, how much variation is there in the materials your students use in mathematics	(1) (2) (3) (4)	All students use the same materials Students are divided into two or three groups, using different materials Students are divided into four or more groups, each group using different materials Each student uses different materials

(Source: Teacher School Climate Questionnaire - Question 38a)

	Item	Code	Response Options
(i)	In general, how much variation is there in the materials your students use in reading	(1)	All students generally use the same materials
		(2)	Students are divided into two or three groups, each group using different materials
		(3)	Students are divided into four or more groups, each group using different materials
		(4)	Each student uses different materials

(Source: Teacher School Climate Questionnaire - Question 38b)

Score 2. Eight standardized scores were summed for the "Degree of Teaming" score. The items included were:

	Item	Code	Response Options
(a)	In which type of classroom space do you usually teach	(1)	Self-contained classroom
		(2)	Classrooms separated by movable partitions which are closed most of the time
		(3)	Classrooms separated by movable partitions which are open most of the time
		(4)	Open space

(Source: Teacher School Climate Questionnaire - Question 7)

(b)	Which of the following most accurately applies to you	(1)	I teach the same class throughout the whole school day
		(2)	I teach the same students during most subjects, but have different students for a few subjects
		(3)	I teach the same subjects to different classes
		(4)	I teach different subjects to different sets of students

(Source: Teacher School Climate Questionnaire - Question 7)

	Item	Code	Response Options
(c)	How frequently do students who are cross-grouped move between your class and another teacher's class in mathematics	(1)	My students are not cross-grouped
		(2)	Less than once a month
		(3)	Once or twice a month
		(4)	Once a week
		(5)	Several times a week
		(6)	Once a day

(Source: Teacher School Climate Questionnaire - Question 11a)

(d)	How frequently do students who are cross-grouped move between your class and another teacher's class in reading	(1)	My students are not cross-grouped
		(2)	Less than once a month
		(3)	Once or twice a month
		(4)	Once a week
		(5)	Several times a week
		(6)	Once a day

(Source: Teacher School Climate Questionnaire - Question 11b)

(e)	On the average, how frequently would you say other teachers at your school are aware of or can see aspects of your performance in teaching	(1)	Less than once a month
		(2)	Once or twice a month
		(3)	Once a week
		(4)	Several times a week
		(5)	Every day

(Source: Teacher School Climate Questionnaire - Question 57a)

(f)	On the average, how frequently would you say other teachers at your school are aware of or can see aspects of your performance in maintaining control in your classes	(1)	Less than once a month
		(2)	Once or twice a month
		(3)	Once a week
		(4)	Several times a week
		(5)	Every day

(Source: Teacher School Climate Questionnaire - Question 57b)

	Item	Code	Response Options
(g)	How often do you discuss your teaching or students with other teachers	(1) (2) (3) (4) (5) (6)	Never Once or twice a year Once or twice a month Once a week Several times a week Every day

(Source: Teacher School Climate Questionnaire - Question 59b)

(h)	How often do you learn in any way, directly or indirectly, other teachers' opinions of how well or poorly you are doing in teaching subject matter	(1) (2) (3) (4) (5) (6)	Never Seldom Occasionally Fairly often Frequently Very frequently

(Source: Teacher School Climate Questionnaire - Question 67a)

Score 3. Student Consensus Factor: Composed of the sum of the following scores derived from analysis of the Pupil Survey Tests.

	Item	Code	Response Options
(a)	Percent of students selected by others as best in reading 80% of the time	Coded as analyzed	
(b)	Percent of students selected by others as best in mathematics 80% of the time	Coded as analyzed	

Score 4. Centralization of Decision Making (Principal Leadership):

(a)	How influential is the principal over the following decision-area lesson content	5 1	Most influential Least influential

(Source: Teacher School Climate Questionnaire - Question 49b)

	Item	Code	Response Options
(b)	How much do school-wide policies or guidelines govern what teachers at your school include in the curriculum for their classes	(1) (2) (3) (4) (5)	Not at all Slightly A moderate amount A considerable amount A great deal

(Source: Teacher School Climate Questionnaire - Question 52)

(c)	How much do school-wide policies or guidelines govern the ways in which teachers at your school evaluate the academic performance of their students	(1) (2) (3) (4) (5)	Not at all Slightly A moderate amount A considerable amount A great deal

(Source: Teacher School Climate Questionnaire - Question 53a)

(d)	On the average, how frequently would you say your principal is aware of or can see aspects of your performance in teaching subject matter	(1) (2) (3) (4) (5) (6)	Never Once or twice a year Once or twice a month Once a week Several times a week Every day

(Source: Teacher School Climate Questionnaire - Question 58a)

(e)	How often do you discuss your teaching or students with the principal	(1) (2) (3) (4) (5) (6)	Never Once or twice a year Once or twice a month Once a week Several times a week Every day

(Source: Teacher School Climate Questionnaire - Question 59a)

	Item	Code	Response Options
(f)	How often do you learn in any way, directly or indirectly, your principal's opinion of how well or poorly you are doing on teaching subject matter	(1) (2) (3) (4) (5) (6)	Never Seldom Occasionally Fairly often Frequently Very frequently

(Source: Teacher School Climate Questionnaire - Question - 66a)

Score 5. Principal Help was composed of the sum of three scores:

	Item	Code	Response Options
(a)	How helpful is your principal providing teachers with ways to gain new teaching ideas (e.g., through in-service training or visits to other schools)	(1) (2) (3) (4) (5)	Not at all helpful Slightly helpful Moderately helpful Very helpful Extremely helpful

(Source: Teacher School Climate Questionnaire - Question 65a)

(b)	In teaching subject matter, how fair and well-informed are your principal's opinions of your work (i.e., to what extent do his/her evaluations accurately reflect the quality of your performance)	(1) (2) (3) (4) (5)	Not at all Slightly Moderately Very Extremely

(Source: Teacher School Climate Questionnaire - Question 68a)

(c)	How helpful are the comments you receive from your principal in improving your teaching performance	(1) (2) (3) (4) (5)	Not at all helpful Slightly helpful Moderately helpful Very helpful Extremely helpful

(Source: Teacher School Climate Questionnaire - Question 70)

CELL 4 | PRINCIPAL'S PERCEPTIONS OF ORGANIZATION

The source for the scores in the Principal's Perceptions of Organization domain of variables was the Profile of a School-Principal Questionnaire.[5] There are two scores, each of which is the sum of the coded responses to the following items. The codes range from "1" to "8" where "1" represents the low end of the scale and "8" represents the high end of the scale. For example, on some questions "1" may represent "Rarely" and "8" represents "Almost Always," while on the other questions "1" represents "Dislike" and "8" represents "Like it very much." The items to be included in each score were obtained through factor analysis.

Score 1. Superintendent's (Perceived) Administrative Style:

Items: 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 82, 83, 84, and 85.

Score 2. Principal's (Perceived) Administrative Style:

Items: 1, 2, 3, 4, 5, 6, 7, 8, 9, 12, 15, 25, 27, 28, 29, 30, 33, 35, 37, 38, 39, and 43.

CELL 5 | TEACHER'S PERCEPTIONS OF ORGANIZATION

The sources for the scores in the Teacher's Perceptions of Organization domain of variables was the Profile of a School-Teacher

[5] Profile of a School, Copyright ©1971, Rensis Likert Associates, Inc. Ann Arbor, Michigan.

Questionnaire.[6] Two scores were used. They were obtained in the same manner as the scores in Cell 4, the Principal's Perceptions of Organization.

Score 1. Principal's (Perceived) Administrative Style:

Items: 26, 27, 28, 29, 30, 32, 40, 41, 42, 43, 44, 45, 46, 47, 48, 50, 51, 52, 53, 55, 58, 59, and 62.

Score 2. Perceived Class Climate:

Items: 1, 2, 3, 4, 5, 6, 7, 10, 17, 18, 20, 21, 23, 24, and 25.

CELL 6 TEACHER'S ATTITUDES

The scores in the Teacher's Attitude domain of variables were obtained from the School Climate Teacher Questionnaire. There were three scores, two of which were obtained by summing item responses; the third score was obtained by adding standardized item responses. The items to be included in each score were obtained through factor analysis. More scores were proposed, but were eliminated by preliminary analyses.

Score 1. Aspirations (The coded responses to the following questions were summed.)

Please indicate the level of your agreement or disagreement with the following statements.

---

[6] Profile of a School, Copyright © 1971, Rensis Likert Associates, Inc., Ann Arbor, Michigan

		Strongly agree	Agree	Neutral	Disagree	Strongly disagree
(a)	I would enjoy leading a workshop on teaching techniques.	5	4	3	2	1
(b)	I would be very much interested in showing other teachers styles and techniques I've developed.	5	4	3	2	1
(c)	If my school encouraged me in acquiring a supervisory certificate by financing me, I would be extremely interested.	5	4	3	2	1
(d)	I personally wish good teachers got more recognition.	5	4	3	2	1
(e)	I would be competent at making supervisory evaluations of other teachers.	5	4	3	2	1
(f)	It is very important for me to be in a school with many opportunities for the classroom teacher to become a master teacher or administrator.	5	4	3	2	1

(Source: Teacher School Climate Questionnaire - Question 85)

Score 2. Satisfaction (The coded responses to the following questions were summed).

In general, how satisfied are you with the following aspects of the school in which you presently teach?

	Extremely satisfied	Very satisfied	Moderately satisfied	Slightly satisfied	Not at all satisfied
(a) Your relationship with other teachers	5	4	3	2	1
(b) Your relationship with the principal	5	4	3	2	1
(c) Resources or instructional materials available	5	4	3	2	1
(d) Your relationship with parents	5	4	3	2	1
(e) Evaluations of students	5	4	3	2	1
(f) Evaluations of teachers	5	4	3	2	1
(g) Opportunities to try out new teaching approaches	5	4	3	2	1

(Source: Teacher School Climate Questionnaire - Question 86)

(h) In general, how satisfied are you with your occupation as a teacher?	5	4	3	2	1

(Source: Teacher School Climate Questionnaire - Question 89)

	Extremely satisfied	Very satisfied	Moderately satisfied	Slightly satisfied	Not at all satisfied
(i) How satisfied are you with the frequency of your talks with the principal?	5	4	3	2	1

(Source: Teacher School Climate Questionnaire - Question 60a)

(j) How satisfied are you with the frequency of your talks with other teachers?	5	4	3	2	1

Source: Teacher School Climate Questionnaire - Question 60b)

Score 3. Teacher's Perception of Student Characteristics

(Three standardized scores were summed.)

Item	Codes	Response Options
(a) How good is the educational background of most of the students assigned to you this year?	5	Excellent
	4	Very good
	3	Good
	2	Fair
	1	Poor

(Source: Teacher School Climate Questionnaire - Question 82)

(b) How difficult to control are the students in your class?	5	Extremely difficult
	4	Very difficult
	3	Moderately difficult
	2	Slightly difficult
	1	Not at all difficult

(Source: Teacher School Climate Questionnaire - Question 83)

(c) Which is the best estimate of the average economic level of families whose children are in your class(es)? Check only one.	1	Low-income
	2	Low-middle-income
	3	High-middle-income
	4	High-income

CELLS 7a and 7b

TEACHER'S KNOWLEDGE OF SUBJECT AND OF TEACHING

The scores for the domains of variables, Teacher's Knowledge of Subject and Teacher's Knowledge of Teaching were obtained from tests included in the fall Teacher Test Battery. Two scores were included, each of which is obtained by adding together the standardized scores of the tests used to form that score. (See Chapter 1 - Volume V for details on the tests.)

Score 1. Knowledge of Teaching

(Cell 7b)

Second Grade Teachers:

Reading (tests 708 and 709 - primary knowledge and primary application)

Mathematics (test 718 - Teaching Mathematics)

Fifth Grade Teachers:

Reading (tests 710 and 711 - intermediate knowledge and intermediate application)

Mathematics (test 718 - Teaching Mathematics)

Score 2. Knowledge of Subject Matter

(Cell 7a)

Reading (tests 703, 704, 705, 706 and 707 - decoding, root words, affixes, syllabification and inference)

Mathematics (test 716 - mathematics computation)

CELL 8 TEACHER'S APTITUDES

The scores for the Teacher's Aptitudes domain of variables were generated from the spring and fall Teacher Test Battery. There are five scores, each of which is obtained by adding together the standardized scores of the tests used to form the scores. The first four scores were obtained through factor analyses. (See Chapter 1 - Volume V for details of the factor analyses and descriptions of the tests.)

Score 1. Verbal Fluency

Test 701 - Verbal Facility
702 - Vocabulary
725 - Topics
727 - Controlled Associations
728 - Making Sentences

Score 2. Memory

Test 712 - Memory
724 - Sentence Completion

Score 3. Reasoning

Test 713 - Picture Grouping
714 - Nonsense Sayings
715 - Induction
717 - Mathematics Aptitude

Score 4. Flexibility

Test 721 - Useful Parts
726 - Story Surprises
729 - Listing Objects
730 - Planning

Score 5. Cognitive Style

Test 723 - Embedded Figures Test[7]

[7] H. Witkin, Published by Consulting Psychologists Press, Palo Alto, California, 1971.

The construction of the scores for all of the domains of variables preceding teaching performance and pupil behavior, which are included in the "Structural Model of the Domains of Variables Influencing Teaching Performances and Children's Training," has been presented in this section. Information describing the scores for the "Teaching Performance" and "Student Behavior" domains of variables has been presented. In the last section about the construction of scores, the domains of variables in the model which relate to student learning and the variables within the student learning domain itself will be described.

CELLS 9a and 9b | STUDENT APTITUDE

The scores for the domains of variables, Student Verbal Aptitude and Student Cognitive Style, were obtained from two tests which were part of the fall and spring Student Test Battery. They were the Short Form Test of Academic Aptitude[8] and the Embedded Figures Test.[9] The Embedded Figures Test was modified for use with second grade students. (See Volume IV for a complete description.)

Two scores were used. They were obtained by averaging the score for each student in a classroom on each of the two tests. Pupil scores were included only if a Phase II teacher actually taught that

[8] Published by CTB, McGraw Hill, Monterey, California, 1970.

[9] Published by Consulting Psychologists Press, Palo Alto, California, 1971.

pupil reading or mathematics. The average classroom scores were then standardized. The two scores were:

Score 1. Verbal Aptitude

(Cell 9a)

(Source: Short Form Test of Academic Aptitude)

Score 2. Cognitive Style

(Cell 9b)

(Source: Embedded Figures Test)

CELL 10 STUDENT'S ATTITUDES

The scores for the domain of variables, Student's Attitudes, were obtained from the Attitude Survey. The Attitude Survey was administered as part of both the fall and spring pupil test batteries. The two scores used were the fall and spring scores. The scores were obtained by averaging over the classroom (pupils taught reading or mathematics by a Phase II teacher) the percentage of appropriate positive responses on the total test by each student.

An appropriate positive response would be the response "Happy" of a second grade student to the question, "When I am learning to read, I feel..."; or it would be the response "Sad" to the question, "On days when we don't have a math lesson, I feel ...." Classroom averages for reading or mathematics were then standardized. The two scores used were:

Score 1. Fall attitude toward Reading and Mathematics.

Score 2. Spring attitude toward Reading and Mathematics.

CELL 11 | STUDENT LEARNING |

The sources for the scores in the Student Learning domain of variables were tests in the fall and spring Student Test Batteries. Five scores were used for the reading analysis and four scores were used for the mathematics analysis. Again, only scores of students taught reading or mathematics by Phase II teachers are included. The scores were obtained in the following manner:

Definitions:

Test Number	Name
1	CAT Reading Comprehension (X01)[10]
2	CAT Math Concepts (X02)
3	CAT Math Computation (X03)
4	ETS Reading Application (X06)
5	ETS Reading Achievement (X09)
6	ETS Math Application (X08)
7	ETS Decoding (X07)

R_i : number right on test i, i=1,...,6,7

a_i : adjustment factor added to R_i, i=1,2,3 (adjusting for number of and difficulty of items not taken)

AR_i : adjusted number right, i=1,2,3

D_i : associated developmental score for test i, i=1,2,3

m_i : minimum (C_f, C_s), i=1,2,3

C_f : Fall CAT developmental score

C_s : Spring CAT developmental score

M_i : maximum (C_f, C_s), i=1,2,3

T_i : total number of items associated with test i, i=1,...,6
however

$$T_i = M_i - m_i \text{ for } i=1,2,3$$

[10] Test code: where X = 2 for Grade 2, X = 5 for Grade 5

P_i : percentage score, i=1,..1,7

TR : total reading score

TM : total math score

Calculations:

$$AR_i = R_i + a_i \quad i=1,2,3$$

Using the CAT Achievement Developmental Scale Score table, the score D_i associated with AR_i was found. (i=1,2,3)

$$\therefore P_i = \frac{D_1 - m_i}{T_i} \times 100 \quad i=1,2,3$$

$$P_i = \frac{R_i}{T_i} \times 100 \quad i=4,5,6,7$$

$$TR = P_1 + P_4 + P_5$$

$$TM = P_2 + P_3 + P_6$$

} All three scores must be present to have a total score

Once the percent scores were obtained for each student, a difference score (the difference between the spring and fall scores) was obtained for each student who had scores on both the spring and fall versions of a given test. (For total scores, the student had to have taken all of the spring and fall tests included.) The scores used in the analyses were obtained by averaging the difference scores of pupils in a class. The average class difference scores were then standardized.

Reading Score 1:

Average Class Difference - CAT Reading Comprehension

Reading Score 2:

Average Class Difference - ETS Reading Application

Reading Score:

Average Class Difference - ETS Decoding

Reading Score 4:

Average Class Difference - ETS Reading Achievement

Reading Score 5:

Average Class Difference - Total Reading

Mathematics Score 1:

Average Class Difference - CAT Mathematics Concepts

Mathematics Score 2:

Average Class Difference - CAT Mathematics Computation

Mathematics Score 3:

Average Class Difference - ETS Mathematics Application

Mathematics Score 4:

Average Class Difference - Total Mathematics

CELL 16 STUDENT'S EXPECTATIONS

Scores for the Student's Expectations domain of variables were obtained from the Pupil Survey. The Pupil Survey was given as a part of both the fall and spring Student Test Battery. Two scores, the fall score and the spring score, were used. As was the case in all analyses done, reading scores were used in the reading analysis and mathematics scores were used in the mathematics analysis. The two scores were obtained by averaging over the pupils in the class (those students taught by Phase II teachers) the percentages of more positive responses.

As an illustration of the rationale for the scoring process, two kinds of items, responses and scoring procedures, will be described. A student was asked to respond to the question, "Will you be a good math student next year?" The response options and scores associated with each were:

scored

(3) I will be very good in math

(2) I will be O.K. in math

(1) I will not be too good in math

Students were also given a group of math problems. They were asked "...to put an X on the problems you think you can do. Do not try to solve the problems." A higher score would reflect a greater number of problems a student indicated that he or she could do. A high score in the Student's Expectations domain means that students had more positive expectations about their ability to perform in either reading or mathematics. The percentage scores were then standardized. The scores included were:

Reading Score 1: Fall reading expectations

Reading Score 2: Spring reading expectations

and

Mathematics Score 1: Fall mathematics expectations

Mathematics Score 2: Spring mathematics expectations.

Summary

We have described the samples of districts, teachers, and pupils who comprise the sources of the data base analyzed for this study. The organization of all of the measures into the domains of variables used in the analyses has been reviewed. Those analyses have been described in terms of the technical analytic procedures that were used. All of the variables described in the domains will be used in the analyses that are the focus of the discussions in the chapters that follow.

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BEGINNING TEACHER EVALUATION STUDY: PHASE II

FINAL REPORT: VOLUME I, CHAPTER 7

THE RELATION OF TEACHING PERFORMANCE TO PUPIL ACHIEVEMENT

INTRODUCTION

In this chapter we present the multiple and stepwise regressions of achievement scores on teaching performances. In the next chapter we will look at the same data in a somewhat different way. Actually, we performed the analysis presented in Chapter 8 before we did this analysis. In the steps leading to the results presented there, we found by performing regression analyses by class that the slopes of the individual class regressions were not parallel. This fact limits considerably the value of analyses presented in this chapter. These analyses do not reveal the interaction between differences in teaching style and differences in pupil achievement.

The analyses in this chapter are presented because some people who saw drafts of the analysis plan asked for the regressions across all the classes within a grade and by subject. We present these analyses for two reasons: (1) they are a routine and conventional way of analyzing data and many readers will be expecting them, but we do so with the warning that classes are being included in a total analysis which in fact are different; (2) they are offered as data that may be compared with the regressions in Chapter 8. We think that in a study as complex as this one, different ways of looking at the data are useful in the first analyses. Also any variable that is a significant predictor in the following analyses may be the characteristic performance of teachers who would be outliers in a regression by class.

The data in this chapter are presented as in all following presentations by grade and by subject. Analyzing the data in this way considerably reduces the degrees of freedom; therefore, we run the risk of missing significant predictors. But the advantage of analyzing the data by grade and subject is that if different performances are significant predictors at each grade and in each subject, this analysis will reveal the differences; it will also show if any teaching performances are significant irrespective of grade and subject. The reader, however, should be alert to the decreasing probability of finding significant predictors as the number of degrees of freedom (estimated from the number of teachers by grade and subject) decreases.

The Logic of the Analysis

In Chapter 3 we presented a complex model of hypothesized relations among the variables measured in this study. These variables fall into five major categories: (1) the dependent variables, which are the categories of students' learning which were of interest in this study; (2) a set of independent variables describing student characteristics which is predicted to have an effect upon student learning; (3) another set of independent variables predicted to have a direct effect on students' learning; two kinds of variables comprise this set, one kind describes student behavior as observed in classrooms, and the other kind describes teaching performances which were also observed in the classroom; (4) a set of independent variables related to

characteristics of teachers which is predicted to have an effect upon teaching performances (also treated as a set of dependent variables); (5) a set of independent variables describing the organizational structure which is also predicted to have an effect upon teaching performances. Analyses of the relations among these sets of variables lead to answers to the following questions:

1. What patterns of teaching performance and student behavior significantly affect students' learning?
2. What influence do variables associated with students' characteristics have on students' learning?
3. What factors associated either with characteristics of the teachers themselves or with the teaching environment significantly influence teaching performance?

The first of these questions is obviously the critical question. If relations are not found between teaching performances, student behavior and students' learning, other questions acquire a new significance. The logic of this point needs to be developed. Consider three kinds of factors: measures of teachers' aptitudes; measures of teaching performances and student behavior; and measures of students' learning. Assume that no significant relations are found between teaching performances-student behavior and students' learning. It is still possible to have found a relation in the form of a correlation between teacher aptitude and student learning. Assume that such a relation has been found.

Two conclusions from such data are obvious: one, that the set of variables describing teaching performances and student behavior do not account for variations in students' learning. A second conclusion is that there may be a relation between teaching aptitude and student learning.

This second conclusion may be treated in either of two ways. It may be regarded as an interesting relation but one which cannot be explained either in terms of the data available in the study or in terms of a theoretical conception of the relations. A second explanation is that the system for observing teaching performances did not include those teaching performances most closely linked to aptitude, and therefore, the performances most likely to affect students' learning were not measured. The validity of this explanation cannot be estimated in this study, but the explanation is plausible and should be considered in designing future studies.

Both of these explanations derive from the same principle. We have assumed that any factor remote from teaching actions such as a general aptitude must be mediated through some observable event such as a teaching performance. The causal model in Figure 2.6 portrays this principle by predicting that teaching aptitudes will directly affect teaching performances. But, if a correlation is found between teachers' aptitudes and students' learning, but not between teaching aptitudes and teaching performances or between teaching performances and student learning, a reasonable inference is that the critical events mediating

aptitude have not been measured. A more restrictive conclusion is that although a correlation has been found between teachers' aptitude and students' learning, it is essentially unexplainable and in fact may be a chance variation considering the large number of interrelations being studied.

The reason for using a path model to analyze the data was to permit exploration of possibilities of this kind. The model is a set of predicted relations which are relatively simple and straightforward and built on a minimum number of assumptions. If these predictions are supported by the data, then the model provides an "explanation" of relations. If the predictions portrayed in the model are not supported by the data, such relations as are found provide a basis for reconceptualizing relations and for suggesting both other hypotheses and procedures for the measurement of variables.

Major Types of Analysis

In the analysis three general lines of inquiry were pursued. The first line of inquiry begins by regressing the residual and mean difference scores on teaching performances. These multiple regressions were done in three ways: (1) by using one performance variable at a time; (2) by grouping the performances by observation instrument; and (3) by using all the performance variables in a group. The first analysis estimates the relation of a performance variable by itself to the outcome measures. The

second is relevant to the question, has one instrument yielded more significant relations than the others? The third answers the question, how much of the variance in outcomes is accounted for by the set of teaching performances?

These analyses were done to develop better understanding of the data. We did not expect to find a large number of significant relations when the variables were analyzed one at a time because we knew that there was considerable intercorrelation among the variables. Similarly we did not expect the set as a whole to be related to outcomes because some of the members of the set were negatively correlated with each other.

We also performed stepwise regressions on the data. In these analyses the variable with the largest contribution to R^2 is stepped in first; then at the second step, with the first variable kept in the analysis, the variable with the largest contribution to R^2 is stepped in. This method probably takes a reasonable account of the intercorrelations among the performance variables.

This line of inquiry is relevant to the questions: (1) how much of variance in pupil achievement is accounted for by one or more teaching performances; and (2) are there teaching performances which are significant predictors at both grades and in both subjects. Chapter 7, this chapter, presents the results of the analyses relevant to these questions.

The second line of inquiry is to explore the question of the relation between teaching performance and student learning <u>in terms</u>

of the differences in patterns of pupil achievement. The first step is to study the differences in students' performances on measures of reading and mathematics. Two kinds of results are possible: (1) all classes gain proportionately, some more than others but those classes being those which were initially higher; (2) of classes which were initially similar, some gain more than others.

Of the two possible categories of results, the second would be most useful for the purposes of this study. If two classes have similar scores initially, for example, it is a reasonable assumption that their performances have resulted from similar complexes of factors. If their final performances are significantly different, however, it is plausible that factors associated with instruction, among which are teaching performances, will be significantly related to these differences.

The relation of teaching performances to differences in achievement across all teachers irrespective of the differences among their classes is studied in this chapter. The topic of Chapter 8 will be the examination of differences in students' performances from teacher to teacher and how teaching performances relate to such differences. The model of predicted relations among all the variables will be discussed in Chapter 9. The results across all analyses are summarized in Chapter 10.

The analysis of the differences between fall and spring scores is concerned with the amount and rate of these changes. All classes may gain a comparable amount or some classes may gain considerably more in measured performance than do other classes. Similarly the rate of change[1] may be comparable across classes or there may be differential rates of changes among the classes.

These differences in amount and rate of change are basic to the analysis of the data in this study. If there are differential changes either in amount or rate or both, then it is possible to compare the teaching performances of teachers whose classes made greater gains or the teachers may be compared in terms of the differences in rates of change. Such analyses should yield information on whether or not the teaching performances of these two groups of teachers are different. If they are, then we have support for hypotheses about effective teaching performances. These analyses are presented in Chapter 8.

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[1] The rate of change is the ratio of the mean increment in spring scores to the mean increment in fall scores. Suppose that in one class a fall score of 120 corresponded to a spring score of 130. Then $\frac{\Delta y}{\Delta x} = \frac{10}{20} = .5$ for this particular set of scores. In another class, suppose that the spring score corresponding to a fall score of 120 was 140. Then $\Delta x = 20$, but $\Delta y = 20$, and $\frac{\Delta y}{\Delta x} = \frac{20}{20} = 1.00$. Thus, in the second class a difference in fall score of 20 is associated with a greater difference in spring scores. The difference in spring scores per unit of difference in fall scores is greater in the second class than in the first class. The rate of change in the two classes is different for individuals whose fall scores differed.

When all such differences are minimized according to the least squares principle, the minimum value of these differences approaches the slope of the regression line. The slope of the regression line therefore is a way of describing the difference in spring scores in relation to differences in the original fall scores.

The possibility of finding teaching performances which affect learning is greater when classes initially similar in performance differ significantly at the final testing. The socioeconomic status of the children has not changed or certainly not enough to affect the final performance. Most likely the school environment has remained relatively constant. Therefore, the relative constancy of such factors draws our attention to factors directly associated with instruction as the likely source of the differences among classes which were initially similar.

The third line of inquiry presents the analysis of the path or causal model. This model describes hypothetical relations among all the variables. Pupil learning and teaching performances appear also in this model but as dependent on or related to other variables. The technique of path analysis was used to analyze the dependencies and relations among the variables in the model. From the results chains of dependencies may be inferred.

This analysis is relevant to the following questions: (1) what teaching performances influence pupil learning, but here the analysis is made by taking pupil behavior into account; (2) what other factors influence pupil learning and how much of the differences in learning is accounted for by these other factors; (3) what factors influence differences in teaching performances?

Thus by using the model a large number of hypotheses will be tested. The degree to which the data fit the model determines the

potential validity of the hypotheses underlying its structure. When relations are not found as predicted, it will be possible to consider other relations appearing in the data and to suggest other hypotheses and models. The results of this analysis are presented in Chapter 9.

Types of Achievement Scores Used in the Analyses

Two types of scores were used in these analyses, residual scores and mean difference scores. When spring scores, with fall scores partialled out, are regressed against teaching performance variables, a significant association means that the teaching performance is accounting for the variation in spring scores. That portion of the variance in spring scores accounted for by the variance in fall scores has been "removed" in the analysis. Since we know that fall scores correlate substantially with spring scores, this analysis tells us how much of the variance in spring scores is accounted for by teaching performance <u>independently</u> of this correlation.

In the second kind of regression analysis mean difference scores are regressed against teaching performances. This analysis tells us how much of the variance in score changes is accounted for by teaching performances. The path analysis, to be presented in Chapter 9, will describe how much of the variation in these changes is accounted for by other factors.

Order of Analyses

In the analyses presented in the following sections both kinds of outcome measures were regressed on teaching performances. The analyses with residual scores are presented first in the following order:

1. Outcome measures are regressed against the total group of performance scores (as described above).
2. Outcome measures are regressed against each performance score.
3. Outcome measures are regressed against Work-Diary scores as a group, RAMOS scores as a group, and APPLE scores as a group.

Then the analyses of mean difference scores are presented in the same order.

The results of these analyses give us a picture of the general pattern of relations among the performances and the outcome measures. But it should be remembered that considerable multicollinearity appears in these analyses. Conceptually it should also be obvious that a particular teaching performance is not necessarily an independent event sampled by the observation. Therefore, a sensible approach is to perform stepwise regressions so that we see the contribution of one teaching performance with respect to others. These analyses are reported in the sections following the multiple regressions.

In summary, the reader will be presented with the regressions of two kinds of outcome measures against teaching performances in which scores for the performances are entered individually and in groups. These analyses are followed by the results of the stepwise regressions in which the relative contributions of the performances to both kinds of outcomes are considered. The residual score analysis estimates how much of the variance is accounted for after the influence of fall scores is removed. The mean difference analysis estimates the relation to differences in amount of change.

Pupil Achievement Scores Used

The total reading score and the total mathematics score were used in these analyses. This total reading score is a composite of the California Achievement Tests Reading Comprehension score and the scores from the reading achievement, reading applications and decoding skills tests. These latter three tests were developed for this project. The total score was used because it is the best estimate of the pupils' overall skill in reading. The total mathematics score is a composite of the concepts and computation sections of the California Achievement Test and the mathematics applications test which was built for this project. It is the best estimate of the pupils' overall knowledge and skill in mathematics.

Ratio of Performance Variables to Teachers

Some readers as they study these analyses will be concerned about the relation of sample size to the number of variables entered into the regressions. The largest number of variables entered into any one regression is 22, the total set. The degrees of freedom in this analysis is 40. As the number of variables approaches the number of degrees of freedom, the multiple regression coefficient, R, over estimates the universe value.

The universe value may be estimated by the following formula:

$$R' = \sqrt{1-(1-R^2)\frac{N-1}{N-n}}$$

where N = sample size, and n = number of variables.

This formula was used to compute the values in the table below:

			R' N/n		
R	2.00	1.69	1.33	1.11	1.05
.75	.36	-			
.80	.54	.39	-		
.90	.79	.74	.50	-	
.95	.89	.87	.77	.10	-
.98	.96	.95	.92	.78	.46

The ratio of N=40 to n=22 is 1.81. As can be seen R's between .80 and .90 are probably smaller. Since in all other analyses the ratio of N to n is considerably larger than 2, the distortion is minimal for large values of R.

Teaching Performance Variables

A number of different analyses will be reported in these chapters. In all cases the group of teaching performances previously described will be the same (see Chapters 4 and 6). There are 22 such variables. Five were produced by the Work-Diary instruments which were self-report measures in which teachers indicated their teaching goals, methods and materials at two different times in the year. Scores derived from this instrument are indirect measures of actual performance. These scores are labeled WD-1, WD-2...WD-5 in the tables on the following pages.

A second group of scores were derived from RAMOS (Reading and Mathematics Observation System). This set was developed from observations in the classroom made by using this observation system.[2] The scores were transformed in several steps, the final set of four scores being derived by grouping scores that were logically related to each other. This grouping (see Chapter 4) was necessary because when the original scores were entered into multiple regression routines, the analysis could not be performed because of the high degree of multicollinearity among the measures. These four scores appear as R-1, R-2, R-3, and R-4 or RAMOS 1,...RAMOS 4 in the tables in this chapter.

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[2]A complete description of RAMOS and APPLE is given in Volume III of this report. The Work Diary is described in Volume V.

Thirteen scores were derived from the APPLE (Anecdotal Processing to Promote the Learning Experience) Observation System. These scores were derived by combining a larger set for the same reason that the RAMOS scores were combined. These scores appear as AP-1,...AP-14, or APPLE-1,...APPLE-14 in subsequent tables.

Work-Diary scores measure five aspects of teaching. WD-1 is a measure of the time spent preparing and teaching reading and mathematics. WD-2 measures the number and type of skills taught. WD-3 is a rating of the quality of teaching methodology.

These three scores may be viewed as indices of instructional "input" in terms of time spent, the frequency and range of what was taught, and the quality of teaching. Since teaching is a time-bound activity, amount of time spent is one measure of the "availability" of instruction (WD-1). The variety of skills taught is a measure of the "breadth" of the learning opportunities (WD-2). Instruction is also represented in the plan which the teacher uses. This plan is defined in part by the specific goals of instruction, the techniques of instruction, and the materials used. An estimate of the teacher's ability to design a potentially effective instructional plan is estimated by WD-3, Complexity of Instructional Design.

These three variables are indices of instructional investment. WD-1 is an index of the energy expended by the teacher actually

teaching; WD-2 is an index of the amount of content or level of skill that can be learned; WD-3 is an index of sophistication of the instructional strategy being used.

The magnitudes of correlations among these variables differ by subject and grade:

	GRADE 2		GRADE 5	
READING	WD-1	WD-2	WD-1	WD-2
WD-1	1.00		1.00	
WD-2	.0119	1.00	.1179	1.00
WD-3	.0639	.0532	.0489	.2983

	GRADE 2		GRADE 5	
MATHEMATICS	WD-1	WD-2	WD-1	WD-2
WD-1	1.00		1.00	
WD-2	.3213	1.00	.3001	1.00
WD-3	- .0751	.1729	.3618	.2833

At the second grade and in reading the three measures are unrelated. At fifth grade and in reading WD-2 (content covered) and WD-3 (complexity of instructional design) are modestly related (r = .28). This relation may occur because some teachers are doing more at fifth grade--covering decoding skills, many aspects of reading comprehension, and the development of language skills and, therefore, design more complex instructional systems.

In mathematics at second grade WD-1 and WD-2 are related; i.e., the teacher who covers more content spends more time instructing.

At the fifth grade in mathematics the three variables are all correlated.

Thus these three variables probably reflect the complexity of the instruction in terms of the substance covered in a subject at a grade. In the regressions only one of these variables may be a significant predictor, but the reader should recall or review the correlates of that predictor.

WD-4 and WD-5 are measures related to how instruction is organized. WD-4 is a measure of the variety of instructional contexts used by the teacher. WD-5 is a measure of the variety of instructional materials. WD-4 is correlated with WD-1, WD-2, WD-3, and WD-5 as follows:

	READING		MATHEMATICS	
	GRADE 2	GRADE 5	GRADE 2	GRADE 5
	WD-4	WD-4	WD-4	WD-4
WD-1	.21	.30	.37	.37
WD-2	.37	.37	.44	.67
WD-3	.04	-.11	.06	.10
WD-5	.11	.16	.02	.18

The variety of instructional contexts (WD-4) appears to be related to WD-1, time spent preparing and teaching and to WD-2, content covered, but is unrelated to the complexity of the instructional design (WD-3) or the variety of materials used (WD-5).

WD-5 is correlated with WD-1, WD-2, and WD-4 as follows:

	READING		MATHEMATICS	
	GRADE 2	GRADE 5	GRADE 2	GRADE 5
	WD-5	WD-5	WD-5	WD-5
WD-1	.24	.19	-.04	.13
WD-2	.24	.05	.23	.05
WD-3	.43	.13	.18	.09

WD-5, variety of materials used, is correlated with WD-1, WD-2, and WD-3 in second-grade reading.

The correlations among the WD variables suggest two patterns. One of these in the second-grade reading correlations appears to be related to the variety of materials used (WD-5). The other, in the second-grade mathematics and in fifth-grade reading and mathematics, appears to be related to the amount of content covered (WD-2).

The reader should remember two facts about the WD variables when reading the regression analyses. These variables are moderately correlated; one may appear as a significant predictor but its correlates may not. We think that it is useful in interpreting the data, however, to keep these correlates in mind. The other fact to remember is that the range of the variables was restricted. The correlations among them cannot be large. But a positive correlation means that teachers who reported one kind of activity were likely to have reported another. So contrasting patterns are probably in these correlations--one pattern made up of higher frequencies

on several variables and its contrast made up of lower scores on several variables and a higher score on one.

The RAMOS scores in their grouped form measured four aspects of teaching. R-1 is a measure of the time spent in instruction by the teacher and in support for instruction. R-2 is a measure of time spent acquiring and practicing skills, and is an estimate of the range or amount of content covered. R-3 is a measure of the variety of instructional materials used and R-4 is a measure of the time spent in seatwork, a major indicator of how much direct instruction a pupil may be receiving.

These four variables are correlated as follows:

READING

	GRADE 2			GRADE 5		
	R-1	R-2	R-3	R-1	R-2	R-3
R-1	1.00			1.00		
R-2	.59	1.00		.42	1.00	
R-3	.18	.52	1.00	.59	.58	1.00
R-4	.18	.45	.60	.56	.53	.59

MATHEMATICS

	GRADE 2			GRADE 5		
	R-1	R-2	R-3	R-1	R-2	R-3
R-1	1.00			1.00		
R-2	.64	1.00		.73	1.00	
R-3	.73	.73	1.00	.68	.69	1.00
R-4	.66	.50	.51	.56	.76	.74

With the exceptions of r's between R-1, R-3, and R-4 at second-grade reading, the RAMOS variables are substantially intercorrelated. The common pattern running through these grouped variables is one represented by high scores on all these variables (and the opposite, low scores); it includes time spent in a variety of instructional activities--explaining or demonstrating, evaluating, diagnosing; while covering more content and providing more time for practicing and reviewing; both of these being done with a variety of instructional materials; and where the pupils spend more time working independently on the instructional materials with the teacher moving from pupil to pupil.

The practical problem in analysis is that because of the high intercorrelations among the variables, only one of them may appear as a significant predictor in a regression analysis. In such cases the reader should recall the high correlations among the RAMOS variables. Finding one significant RAMOS predictor in an analysis probably means we are finding a pattern significantly related to outcomes. When no RAMOS variable appears significant in an analysis, it probably means that the pattern is not significantly related to differences in achievement.

APPLE-1, is an index of the quality of the pupils' observed performance in reading and mathematics. APPLE-2 and 3 are measures of the students' task involvement; APPLE-2 measures inattentive or indeterminate behavior; APPLE-3 measures on-task behavior.

AP-1, AP-2, and AP-3 are correlated as follows:

	READING				MATHEMATICS			
	GRADE 2		GRADE 5		GRADE 2		GRADE 5	
	AP-1	AP-2	AP-1	AP-2	AP-1	AP-2	AP-1	AP-2
AP-1	1.00		1.00		1.00		1.00	
AP-2	- .29	1.00	- .33	1.00	- .35	1.00	- .17	1.00
AP-3	- .08	- .15	- .05	- .65	- .46	- .18	.06	- .13

The correlation between AP-1, pupil productivity and AP-2, inattentiveness is consistently negative. Attentiveness (AP-3) and inattentiveness (AP-2) are also negatively correlated but substantially so only at fifth-grade reading. These correlations are relatively modest, except that between AP-2 and AP-3 at fifth-grade reading.

APPLE-5, 6, and 7 describe the learning context by the organization of students: APPLE-5, working alone; APPLE-6, working in a group with the teacher; APPLE-7, working in the class as a whole with the teacher.

The correlations between these variables are:

	READING				MATHEMATICS			
	GRADE 2		GRADE 5		GRADE 2		GRADE 5	
	AP-5	AP-6	AP-5	AP-6	AP-5	AP-6	AP-5	AP-6
AP-5	1.00		1.00		1.00		1.00	
AP-6	.02	1.00	- .47	1.00	- .01	1.00	- .16	1.00
AP-7	- .32	- .36	- .45	- .39	- .53	- .51	- .16	- .32

The correlations between AP-5, independent context, and AP-7, teaching the class-as-a-whole is consistently negative. Similarly, AP-6, teaching in groups is negatively related to AP-7, teaching the class-as-a-whole. Thus, if one of these variables is a significant predictor we also have a fair idea of what is not being done, even though the negative correlate may itself not be a significant predictor of opposite sign.

APPLE-8, 9, 10, and 11 describe different kinds of teacher activities: APPLE-8, organizing and supervising instruction; APPLE-9, general interactive teaching behaviors such as asking and answering questions and checking on students' work. APPLE-10 includes general instructional activities such as discussing, explaining and questioning and answering. (APPLE-10 is goal-directed, topic-oriented, sustained questioning and answering; APPLE-9 is a category comprising any kind of questions asked or answers given which are not a focused series). APPLE-11 describes the location of the teacher-at-desk, at the board, or circulating.

The correlations among these variables are:

READING

	GRADE 2			GRADE 5		
	AP-8	AP-9	AP-10	AP-8	AP-9	AP-10
AP-8	1.00			1.00		
AP-9	- .34	1.00		- .24	1.00	
AP-10	.09	.36	1.00	- .05	- .07	1.00
AP-11	.12	- .20	- .04	- .03	- .16	- .41

MATHEMATICS

	GRADE 2			GRADE 5		
	AP-8	AP-9	AP-10	AP-8	AP-9	AP-10
AP-8	1.00			1.00		
AP-9	.13	1.00		.25	1.00	
AP-10	.08	.20	1.00	-.01	- .11	1.00
AP-11	- .20	- .17	- .24	-.01	.02	- .10

Only a few relations in these matrices are substantial enough to consider. In reading both at second and fifth grade, AP-8, organizing and facilitating is negatively related to AP-9, monitoring pupil progress; but these variables are positively if modestly related in mathematics at both grades. AP-10, developing pupils' understanding is negatively related to AP-11, teacher mobility. AP-9 and AP-10 are positively correlated at second grade in reading. These correlations suggest patterns of instructional activity in these subjects at these grades.

APPLE-12, 13, and 14 are teacher responses during instructional episodes. APPLE-12 behaviors are direct instructional responses such as giving feedback or help or instruction. APPLE-13 is a measure of teacher control of pupil behavior. APPLE-14 is a measure of nonresponsiveness during interaction with pupils.

The correlations among these variables are:

	READING				MATHEMATICS			
	GRADE 2		GRADE 5		GRADE 2		GRADE 5	
	AP-12	AP-13	AP-12	AP-13	AP-12	AP-13	AP-12	AP-13
AP-12	1.00		1.00		1.00		1.00	
AP-13	.09	1.00	.24	1.00	.00	1.00	.02	1.00
AP-14	- .09	.07	- .09	- .05	- .53	- .06	.22	.05

These three forms of teacher responses are unrelated with two exceptions. AP-12, responsiveness to individual pupils is correlated with AP-13, social control at fifth-grade reading (r = .24). AP-12 is negatively correlated (r = -.53) with AP-14, nonresponsiveness to pupils at second-grade mathematics and positively but marginally related at fifth-grade mathematics.

Sample Size in Regression Analyses

Ninety-seven teachers volunteered to participate in this study; of these all but two, who were assigned to other duties, remained in the study for the school year, 1973-74, the data-gathering phase. Fall testing began early in the school year. At that time we tested all of the pupils in each participating teacher's homeroom. In January and February some classes were reorganized; others were shared between teachers in a team-teaching arrangement. After this reorganization we identified which pupils were being taught by which teacher and what subject they were being taught by him or her. The consequence was that some pupils actually being taught reading or mathematics by a teacher were not tested.

We decided not to test these additional pupils because they would have been tested much later than the original testing (reorganizing in some schools went on through January). Where classes had been rearranged there may have been a few pupils who had not been tested, but the bulk of the pupils were those originally tested. Where teachers reorganized classes, and one teacher taught a new group reading, and another mathematics, the new groups were similar in achievement (we so concluded from descriptions by the teacher of the reorganization schema). Therefore parameters estimated from the scores of the pupils tested are probably reliable estimates of the parameters for the whole class. Thus, the N for some "classes" is smaller than the actual number of pupils taught by the teacher. The number of such classes where reorganization was substantial is the difference between the N's for teachers in total and discriminant groups (see Table 7.0).

In all data analyses the pupils actually taught by a teacher were linked with that teacher. The consequence was that some teachers had very few pupils of the original group linked with them. Thus there are two samples in the data. One is composed of 95 teachers who participated in the study; the other is a subgroup of this sample where each teacher has ten or more pupils associated with him or her. The first group is called the Total Group; the subsample is called the Discriminant Group, the name deriving from the fact that it was used in the analyses of differences in classroom performances associated with differences in patterns of pupil achievement (Chapter 8).

The multiple and stepwise regressions of residual and mean difference scores on teaching performances were run on both samples. The results of these analyses for the Discriminant Group are presented in this chapter. The results for the Total Group are in Appendix C. Thus Chapters 7 and 8 present the results of analyses performed using the same group of teachers. The Total Group was used in the path analysis whose results are presented in Chapter 9.

The numbers of teachers and pupils in both groups are presented in Table 7.0. The reader should remember that by using the smaller sample size we are avoiding the risk of estimating the means and variances of a group of pupils from only a few pupils. But in the regression analyses we lose degrees of freedom, thereby making it more difficult to find significant predictors. In the path analysis we used the Total Group because that analysis involves partial correlations where degrees of freedom are lost in the process of calculating these partials.

In summarizing and interpreting the results in Chapter 10 we looked for consistencies across the samples as the basis for the interpretations closest to the results derived from the Discriminant sample. We used the results from the total group to fill out this picture and to suggest hypotheses we thought worth considering.

The analyses reported in the following pages are first sorted by grade and then within grade by subject. Two kinds of analytic techniques were used, multiple regressions and stepwise regressions. Within multiple regression analyses, analyses have been done for

Table 7.0

The Numbers of Teachers and Pupils Included in the Samples for Various Kinds of Analyses

			TYPE OF ANALYSIS							
			Multiple Regression				Stepwise Regression			
		Grade	Reading		Mathematics		Reading		Mathematics	
			T	P	T	P	T	P	T	P
TOTAL TEACHER SAMPLE	Residual Scores	2	40	699	41	765	40		40	
		5	53	1,029	54	1,149	53			
	Mean Difference Scores	2	40	699	41	765	40		41	
		5	53	1,029	54	1,149	53		54	
DISCRIMINANT TEACHER SAMPLE	Residual Scores	2	33	631	37	740	33		37	
		5	41	914	45	1,066	41		45	
	Mean Difference Scores	2	33	631	37	740	33		37	
		5	41	914		1,066	41		45	

all the teaching performance variables as a group, by the variables within an instrument, and individually. Two kinds of scores were used, residual scores and mean difference scores. A typical route through these analyses is:

Grade two Reading ⟶ Residual Scores ⟶ Multiple Regressions Stepwise Regression ⟶ Mean Difference Scores ⟶ Multiple Regressions ⟶ Stepwise Regression

These analyses for the Discriminate Group follow. See Appendix C for the results for the Total Group.

Grade 2 Reading - Residual Scores - Multiple Regression Analyses

Table 7.01 presents the multiple regression of residual scores on all the teaching performances. R = .86 is not significant.

When the variables were grouped by instrument, the WD-group and the RAMOS-group produced significant R's. For the WD-group, R = .55 ($p = .08$), $R^2 = .30$, and WD-1 and WD-4 have significant negative regression weights. For the RAMOS-group, R = .60 ($p = .01$), $R^2 = .36$, and R-2 has a significant negative weight and R-3, a significant positive weight. (See Table 7.02.) Neither the APPLE variables as a group nor their subgroups produced significant R's when residual scores were regressed against them.

Table 7.03 presents the regressions for each variable when residual scores were regressed against it. As can be seen, WD-1, WD-4, R-3, and AP-12 are significant ($p \leq .10$).

Table 7.01

Multiple Regression of Residual Scores on Teaching Performances
Grade 2 Reading (N = 33)

GAIN ANALYSIS GRADE 2 READING

THE DEPENDENT VARIABLE IS TOTREADS. THE MULTIPLE CORRELATION IS 0.8578. THE STANDARD ERROR OF ESTIMATE= 0.0698

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		32.			
UNDER NULL HYPOTHESIS	0.1660	1.0000	31.			
DUE TO HYPOTHESIS	0.1221	0.7359	22.	0.0056	1.1399	0.4408
ERROR	0.0438	0.2641	9.	0.0049		

CONCOMITANT VARIABLES	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH C.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
TOTREADF	0.9901	0.1293	7.6599			0.7085
INDEPENDENT VARIABLES						
KD-1	-1.0812	-0.4408	0.2753	-1.6013	-0.0752	0.9356
KD-2	-0.2743	-0.1118	0.1740	-0.6424	-0.0421	0.8390
KD-3	-0.2009	-0.0819	0.1300	-0.6296	-0.0116	0.7119
KD-4	-0.3711	-0.1514	0.1375	-1.1005	-0.0355	0.7419
KD-5	0.5909	0.2503	0.1875	1.3354	-0.0523	0.3501
RAMDS-1	0.1715	0.0701	0.2093	0.3351	-0.0033	0.8880
RAMDS-2	-0.6993	-0.2852	0.2510	-1.1362	-0.0379	0.9225
RAMDS-3	0.9547	0.4005	0.1616	2.4782	-0.1802	0.8023
RAMDS-4	0.0327	0.0134	0.1486	0.0905	-0.0002	0.7747
APPLE-1	0.3795	0.1546	0.1425	1.0852	-0.0346	0.7600
APPLE-2	-0.0261	-0.0106	0.1471	-0.0723	-0.0002	0.7744
APPLE-3	0.2439	0.0995	0.2780	0.3530	-0.0038	0.9368
APPLE-5	0.1661	0.0679	0.1275	0.5326	-0.0083	0.6982
APPLE-6	-0.5191	-0.2181	0.2284	-0.9549	-0.0268	0.9007
APPLE-7	0.1379	0.0631	0.2005	0.3147	-0.0029	0.8473
APPLE-8	-0.1437	-0.0611	0.1225	-0.4933	-0.0073	0.6473
APPLE-9	-0.3860	-0.1573	0.2596	0.6057	-0.0108	0.9278
APPLE-10	0.5777	0.2355	0.2175	1.0828	-0.0344	0.8969
APPLE-11	0.2379	0.1003	0.1361	0.7409	-0.0161	0.7154
APPLE-12	-0.5824	-0.2373	0.2049	-1.1581	-0.0394	0.8840
APPLE-13	0.0135	0.0057	0.2053	0.0276	-0.0000	0.8776
APPLE-14	-0.2157	-0.0900	0.1471	-0.6118	-0.0110	0.7639

Table 7.02

Multiple Regression of Residual Scores on Work Diary and RAMOS Variables
Grade 2 Reading (N = 33)

GAIN ANALYSIS - GRADE 2 READING K 5

THE DEPENDENT VARIABLE IS TOTREADS. THE MULTIPLE CORRELATION IS 0.5450. THE STANDARD ERROR OF ESTIMATE= 0.0670

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		32.			
UNDER NULL HYPOTHESIS	0.1660	1.0000	31.			
DUE TO HYPOTHESIS	0.0493	0.2971	5.	0.0099	2.1576	0.0852
ERROR	0.1167	0.7029	26.	0.0045		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 26.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOTREADF		0.8744	0.0711	12.2960		0.1127
INDEPENDENT VARIABLES						
WD-1	-0.3760	-0.1533	0.0714	-2.1469	-0.1246	0.1186
WD-2	-0.0673	-0.0274	0.0747	-0.3675	-0.0037	0.1946
WD-3	-0.0446	-0.0182	0.0752	-0.2417	-0.0016	0.2057
WD-4	-0.3244	-0.1323	0.0741	-1.7857	-0.0862	0.1806
WD-5	0.2348	0.0935	0.0833	1.1939	-0.0385	0.3013

THE DEPENDENT VARIABLE IS TOTREADS. THE MULTIPLE CORRELATION IS 0.6036. THE STANDARD ERROR OF ESTIMATE= 0.0625

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		32.			
UNDER NULL HYPOTHESIS	0.1660	1.0000	31.			
DUE TO HYPOTHESIS	0.0605	0.3643	4.	0.0151	3.8681	0.0131
ERROR	0.1055	0.6357	27.	0.0039		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 27.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOTREADF		0.9668	0.0652	14.8224		0.0814
INDEPENDENT VARIABLES						
RAMOS-1	-0.0863	-0.0353	0.0795	-0.4440	-0.0046	0.3773
RAMOS-2	-0.3867	-0.1577	0.0935	-1.6873	-0.0670	0.5517
RAMOS-3	0.7368	0.3091	0.0865	3.5710	0.3002	0.4470
RAMOS-4	-0.1714	-0.0706	0.0797	-0.8859	-0.0135	0.3709

Table 7.03

Regression Parameters for Teaching Performance Variables
Grade 2 Reading - Residual Scores

Performance Variable	|R|	$\sigma_{y.x}$	df	p	Prop. of SQ.
WD - 1	.39(-.39)*	.07	32	.01	.15
WD - 2	.14	.07	32	.45	.02
WD - 3	.02	.07	32	.91	.00
WD - 4	.40(-.40)	.07	32	.02	.16
WD - 5	.06	.07	32	.75	.003
RA - 1	.22	.07	32	.22	.05
RA - 2	.13	.07	32	.49	.02
RA - 3	.42	.07	32	.02	.17
RA - 4	.07	.07	32	.69	.01
AP - 1	.16	.07	32	.38	.03
AP - 2	.20	.07	32	.26	.04
AP - 3	.07	.07	32	.69	.01
AP - 5	.03	.07	32	.86	.001
AP - 6	.29	.07	32	.11	.08
AP - 7	.03	.07	32	.89	.00
AP - 8	.22	.07	32	.23	.05
AP - 9	.14	.07	32	.45	.02
AP - 10	.05	.07	32	.78	.002
AP - 11	.22	.07	32	.23	.05
AP - 12	.32	.07	32	.08	.10
AP - 13	.14	.07	32	.45	.02
AP - 14	.18	.07	32	.33	.03

* Note that the column values are the absolute values of R. The sign of R is given for significant R's.

Thus out of these regressions, four variables appear significant, of which two are negatively related to residual scores, WD-1 (time spent) and WD-4 (variety of instructional contexts). R-3 (variety of materials) is a positive predictor as is AP-12 (responsiveness to individual pupils). An interpretation of these relations may be more meaningful in the context of the stepwise regression.

Grade 2 Reading - Residual Scores - Stepwise Regression

Table 7.04 presents the stepwise regression of residual scores on all the performance variables at Step 3. Beyond Step 3, the significance of F decreases. $R = .68$ ($p < .001$) and $R^2 = .46$; thus, these three variables account for 46 percent of the variance in spring scores after fall scores are partialled out. All three variables have significant regression weights, of which one is positive, R-3 (variety of materials), and two are negative, R-2 (variety of instructional goals) and WD-1 (time spent).

WD-1 is total time. R-2 is a variety of instructional aims reflecting primarily the practice of skills. Higher scores mean that more aims are apparent in the observed lesson. Perhaps too many aims each lesson reduces the time for practicing the skills and assimilating the new concepts. It is not clear why R-3 (variety of materials) is the only positive predictor, given the correlations in the correlation matrix. R-3 is also positively correlated

Table 7.04

Stepwise Regression of Residual Scores on Teaching Performances (Step 3)
Grade 2 Reading (N = 33)

THE DEPENDENT VARIABLE IS TOTREADS. THE MULTIPLE CORRELATION IS 0.6784. THE STANDARD ERROR OF ESTIMATE= 0.0566

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		32.			
UNDER NULL HYPOTHESIS	0.1660	1.0000	31.			
DUE TO HYPOTHESIS	0.0764	0.4602	3.	0.0255	7.9569	0.0005
ERROR	0.0896	0.5398	28.	0.0032		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 28.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOTREADF		0.9641	0.0586	16.4539		0.0681
INDEPENDENT VARIABLES						
RAMOS-3	0.6438	0.2701	0.0686	3.9309	-0.2988	0.2791
RAMOS-2	-0.4482	-0.1828	0.0667	-2.7387	-0.1446	0.2802
RD-1	0.3451	-0.1407	0.0568	-2.4770	-0.1183	0.0068
OTHER VARIABLES				NOW 27.D.F.		
RD-4	-0.1816	-0.0741	0.0613	-1.2082	0.0277	0.1607
RD-5	0.1944	0.0824	0.0602	1.3686	0.0350	0.0736
RAMOS-1	-0.0383	-0.0157	0.0735	-0.2134	0.0009	0.3817
RD-2	0.0293	0.0119	0.0621	0.1922	0.0007	0.1412
RD-3	0.0010	0.0004	0.0561	0.0071	0.0000	0.0185
RAMOS-4	-0.0715	-0.0285	0.0752	-0.3919	0.0031	0.4034
APPLE-1	0.0570	0.0232	0.0601	0.3862	0.0030	0.0870
APPLE-2	-0.0761	-0.0310	0.0595	-0.5214	0.0054	0.0705
APPLE-3	-0.1676	-0.0684	0.0583	-1.1740	0.0262	0.0670
APPLE-5	0.0769	0.0314	0.0578	0.5439	0.0059	0.0101
APPLE-6	-0.0421	-0.0177	0.0688	-0.2574	0.0013	0.2556
APPLE-7	0.0411	0.0168	0.0663	0.2536	0.0016	0.0507
APPLE-8	-0.2055	-0.0873	0.0684	-1.2766	0.0307	0.2721
APPLE-9	-0.0434	-0.0177	0.0607	-0.2914	0.0017	0.1030
APPLE-10	0.0227	0.0092	0.0591	0.1566	0.0005	0.0488
APPLE-11	-0.0005	-0.0002	0.0678	-0.0034	0.0000	0.2180
APPLE-12	-0.1016	-0.0414	0.0696	-0.5948	0.0070	0.3231
APPLE-13	-0.0618	-0.0259	0.0601	-0.4317	0.0037	0.0323
APPLE-14	-0.0947	-0.0395	0.0600	-0.6582	0.0085	0.0491

with AP-12 (responsiveness to pupils), $\underline{r}$ = .35. We suspect that R-3 is representing this combination in this analysis. R-3 is also correlated substantially with R-4 ($\underline{r}$ = .60). Also WD-1 is negatively correlated with AP-12 ($\underline{r}$ = -.34) so we suspect that when teachers describe the amount of time they spend teaching, they are counting mainly time spent explaining, organizing and managing, and are not including time spent interacting with pupils as the pupils work at their seats. The correlations of WD-1 with two other indices of independent pupil work, R-4 and AP-5, are modest; $\underline{r}$ = .18 and .05, respectively.

Grade 2 Reading - Mean Difference Scores - Multiple Regressions

Table 7.05 presents the results of the multiple regression of mean difference scores on all the teaching performances. R is not significant. Only the RAMOS-group produced a significant R when the variables were grouped (see Table 7.06). R = .60, R^2 = .36, and R-3 has a positive and significant weight, and R-2, a significant negative weight.

Table 7.07 presents the results of regressing the mean difference scores against each variable. R-3 is significant and positive, and WD-1 is significant and negative. These have been the only variables consistently found significant in these analyses.

Table 7.05

Multiple Regression of Mean Difference Scores on Teaching Performance Variables
Grade 2 Reading (N = 33)

CLASS AVE. ANALYSIS ON DIS. ANALYSIS DATA BASE - GRADE 2 READING E

THE DEPENDENT VARIABLE IS TOTREAD . THE MULTIPLE CORRELATION IS 0.8961. THE STANDARD ERROR OF ESTIMATE= 0.1404

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		32.			
UNDER NULL HYPOTHESIS	1.0000	1.0000	32.			
DUE TO HYPOTHESIS	0.8030	0.8030	22.	0.0365	1.8524	0.1567
ERROR	0.1970	0.1970	10.	0.0197		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 10.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
INDEPENDENT VARIABLES						
WD-1	-1.2153	-1.2153	0.5193	-2.3403	-0.1079	0.9269
WD-2	-0.8659	-0.8659	0.4999	-1.7320	-0.0591	0.9212
WD-3	-0.3252	-0.3252	0.2503	-1.2996	-0.0333	0.6854
WD-4	0.3379	0.3379	0.3469	0.9740	-0.0187	0.8363
WD-5	0.9601	0.9601	0.3856	2.4897	-0.1221	0.8675
RAMDS-1	-0.2766	-0.2766	0.4686	-0.5903	-0.0069	0.9103
RAMDS-2	-0.5209	-0.5209	0.4472	-1.1649	-0.0267	0.9015
RAMDS-3	1.1994	1.1994	0.3143	3.8159	-0.2869	0.3006
RAMDS-4	-0.0827	-0.0827	0.2847	-0.2904	-0.0017	0.7570
APPLE-1	0.4098	0.4098	0.2630	1.5590	-0.0478	0.7152
APPLE-2	-0.4643	-0.4643	0.3051	-1.5218	-0.0456	0.7884
APPLE-3	0.4472	0.4472	0.5212	0.8579	-0.0145	0.9275
APPLE-5	0.3131	0.3131	0.2523	1.2386	-0.0302	0.6916
APPLE-6	-0.7724	-0.7724	0.4092	-1.8876	-0.0702	0.8323
APPLE-7	-0.1912	-0.1912	0.4404	-0.4342	-0.0037	0.8924
APPLE-8	-0.1435	-0.1435	0.2238	-0.6409	-0.0061	0.6068
APPLE-9	-0.7291	-0.7291	0.4796	-1.4592	-0.0420	0.9211
APPLE-10	0.5592	0.5592	0.3683	1.5182	-0.0454	0.8547
APPLE-11	-0.0684	-0.0684	0.2807	-0.2436	-0.0012	0.7499
APPLE-12	-0.8318	-0.8318	0.4051	-2.0531	-0.0831	0.9800
APPLE-13	0.4677	0.4677	0.5198	0.8997	-0.0159	0.9271
APPLE-14	0.0483	0.0483	0.2570	0.1880	-0.0007	0.7018

Table 7.06

Multiple Regression of Mean Difference Scores on RAMOS Variables
Grade 2 Reading (N = 33)

CLASS AVE. ANALYSIS ON DIS. ANALYSIS DATA BASE - GRADE 2 READING L 5

THE DEPENDENT VARIABLE IS TOTREAD . THE MULTIPLE CORRELATION IS 0.5967. THE STANDARD ERROR OF ESTIMATE= 0.1516

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		32.			
UNDER NULL HYPOTHESIS	1.0000	1.0000	32.			
DUE TO HYPOTHESIS	0.3561	0.3561	4.	0.0890	3.8708	0.0126
ERROR	0.6439	0.6439	28.	0.0230		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 28.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
INDEPENDENT VARIABLES						
RAMOS-1	-0.1309	-0.1309	0.1913	-0.6843	-0.0108	0.3715
RAMOS-2	-0.4054	-0.4054	0.2239	-1.8104	-0.0754	0.5414
RAMOS-3	0.6880	0.6880	0.2043	3.3677	0.2603	0.4490
RAMOS-4	-0.1449	-0.1449	0.1931	-0.7503	-0.0129	0.3836

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Table 7.07

Regression Parameters for Teaching Performance Variables; Grade 2 Reading Mean Difference Scores

Performance Variable	|R|	$\sigma_{y.x}$	df	p	Prop. of SQ.
WD - 1	.34(-.34)*	.17	32	.05	.12
WD - 2	.13	.18	32	.48	.01
WD - 3	.02	.18	32	.89	.00
WD - 4	.11	.18	32	.53	.01
WD - 5	.003	.18	32	.99	.00
RA - 1	.27	.17	32	.13	.07
RA - 2	.19	.18	32	.29	.04
RA - 3	.37	.17	32	.03	.13
RA - 4	.06	.18	32	.73	.003
AP - 1	.27	.17	32	.13	.07
AP - 2	.21	.18	32	.25	.04
AP - 3	.07	.18	32	.71	.004
AP - 5	.02	.18	32	.91	.00
AP - 6	.23	.17	32	.[illegible]	.05
AP - 7	.11	.18	32	.52	.01
AP - 8	.15	.18	32	.41	.02
AP - 9	.11	.18	32	.52	.01
AP - 10	.02	.18	32	.93	.00
AP - 11	.18	.18	32	.30	.03
AP - 12	.25	.17	32	.16	.06
AP - 13	.04	.18	32	.81	.001
AP - 14	.01	.18	32	.95	.00

*Note that the column values are the absolute values of R. The sign of R is given for significant R's.

Grade 2 Reading - Mean Difference Scores - Stepwise Regression

Mean difference scores were regressed against teaching performances. The results of these analyses are presented in Table 7.08. $R = .77$ ($p \leq .01$), $R^2 = .59$, and all but two variables have significant regression weights at Step 8 (WD-3 and AP-5).

The positive and significant predictors are R-3 (variety of materials), AP-1 (productivity during reading), and WD-5 (variety of materials).

The negative and significant predictors are R-2 (variety of instructional goals), WD-1 (time spent), AP-12 (instructional responses).

Variety of materials contributes positively (WD-5 and R-3). It may be that the materials are sufficiently self-instructing. The teacher, however, must select the materials or if they are selected for her must use them appropriately. But we have also seen that R-3 is positively correlated with other indicators of supervised individual pupil work. We suspect R-3 is an indicator of this instructional pattern.

AP-1 is a measure of the child's ability to read as observed. The observer recorded "+" on the observation form whenever a child responded correctly in class or was working productively in his or her workbook or reading book. Higher scores on AP-1 mean more evidence of on-going understanding of the task at hand.

Table 7.08

Stepwise Regression of Mean Difference Scores on Teaching Performances (Step 8)
Grade 2 Reading (N = 33)

CLASS AVE. ANALYSIS ON DIS. ANALYSIS DATA BASE - GRADE 2 READING V

THE DEPENDENT VARIABLE IS TOTREAD , THE MULTIPLE CORRELATION IS 0.7650. THE STANDARD ERROR OF ESTIMATE= 0.1315

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		32.			
UNDER NULL HYPOTHESIS	1.0000	1.0000	32.			
DUE TO HYPOTHESIS	0.5852	0.5852	8.	0.0732	4.2325	0.0028
ERROR	0.4148	0.4148	24.	0.0173		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 24.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
INDEPENDENT VARIABLES						
RAMOS-3	0.8315	0.8315	0.1818	4.5745	-0.3617	0.4769
RAMOS-2	-0.5805	-0.5805	0.1664	-3.4893	-0.2104	0.3756
WD-1	-0.3994	-0.3994	0.1493	-2.6758	-0.1237	0.2242
APPLE-1	0.3365	0.3365	0.1517	2.2182	-0.0850	0.2489
WD-5	0.3838	0.3838	0.1642	2.3369	-0.0944	0.3591
APPLE-12	-0.2744	-0.2744	0.1652	-1.6609	-0.0477	0.3670
WD-3	-0.2406	-0.2406	0.1533	-1.5692	-0.0426	0.2647
APPLE-5	0.1647	0.1647	0.1393	1.1818	-0.0241	0.1098
OTHER VARIABLES				NOW 23.D.F.		
RAMOS-4	-0.0789	-0.0789	0.2034	-0.3878	0.0027	0.5670
WD-4	-0.0963	-0.0963	0.1529	-0.6299	0.0070	0.2419
APPLE-2	-0.1421	-0.1421	0.1492	-0.9525	0.0157	0.2204
APPLE-3	-0.1650	-0.1650	0.1756	-0.9392	0.0153	0.4370
WD-2	-0.0640	-0.0640	0.1533	-0.4178	0.0031	0.2380
APPLE-6	-0.2132	-0.2132	0.1644	-1.2973	0.0233	0.3781
APPLE-7	0.0848	0.0848	0.1534	0.5527	0.0054	0.2436
APPLE-8	-0.1518	-0.1518	0.1626	-0.9334	0.0151	0.3429
APPLE-9	-0.0828	-0.0828	0.1434	-0.5773	0.0059	0.1360
APPLE-10	0.0879	0.0879	0.1568	0.5609	0.0056	0.2761
APPLE-11	0.0143	0.0143	0.1721	0.0833	0.0001	0.3912
RAMOS-1	-0.1962	-0.1962	0.2227	-0.8809	0.0135	0.6483
APPLE-13	-0.0682	-0.0682	0.1495	-0.4564	0.0037	0.2003
APPLE-14	0.0566	0.0566	0.1478	0.3831	0.0026	0.1793

Such behavior may be related to the pupils' aptitude or prior knowledge or to the teacher's skill or to the quality of the instructional materials.

The correlations with such factors are presented below:

	Ap-1
S-Aptitude	.08
Ap-6	.37*
Ap-7	.14
Ap-10	.30
Ap-12	.29
Mean Difference	.22

$r = .35$ for $p \leq .05$*

The largest correlation is with AP-6 (teacher-group), and next largest with AP-10 and AP-12, both teacher-instructing variables. One suspects, therefore, that AP-1 is a proxy for certain kinds of teaching performances.

But AP-12 in this analysis has a negative weight which is inconsistent with the suggestion made above. Again speculating, it may be that unless there is some combination such as AP-6 and AP-12, AP-12 is associated with ineffective instruction.

R-2 (variety of goals) and WD-1 (time-spent) are negative predictors. Perhaps trying to do many things without using effective instructional techniques is less helpful and may be interfering with learning.

Grade 2 Mathematics - Residual Scores - Multiple Regressions

Residual scores were regressed on all teaching performance variables; the results of this analysis are in Table 7.09. R = .77 but is not significant. None of the groupings by instrument produced a significant R, except the WD-group. The results of this analysis appear in Table 7.10. R for this group is .59 ($p \leq .02$), and $R^2 = .35$. WD-4 has a significant and negative regression weight.

The results of the regressions of residual scores on each variable are summarized in Table 7.11. WD-4 (variety of instructional contexts) and AP-7 (teacher-class) have significant R's and each would account for a substantial portion of the variance in spring scores after fall scores are partialled out, 18 and seven percent respectively.

Grade 2 Mathematics - Residual Scores - Stepwise Regression

Table 7.12 presents the results of the stepwise regression of residual scores on teaching performance variables. In this regression, R = .67, $R^2 = .45$; the variables at Step 6 account for 45 percent of the variance in the residual scores.

Variables with positive and significant regression weights are AP-11 (teacher mobility) and WD-2 (variety of skills taught). Variables with significant and negative weights are WD-4 (variety of instructional contexts) and AP-7 (teacher-class).

Table 7.09

Multiple Regression of Residual Scores on Teaching Performances
Grade 2 Mathematics (N =37)

THE DEPENDENT VARIABLE IS TOTMATHS. THE MULTIPLE CORRELATION IS 0.7727. THE STANDARD ERROR OF ESTIMATE= 0.0875

	SUM OF SQUARES	PROPORTION OF SQUARES	D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		38.			
UNDER FULL HYPOTHESIS	0.2473	1.0000	38.			
DUE TO HYPOTHESIS	0.1476	0.5971	22.	0.0067	0.8758	0.6211
ERROR	0.0998	0.4029	13.	0.0077		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 13 D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOTMATHF		0.8260	0.1425	5.7980		0.6224
INDEPENDENT VARIABLES						
AL-1	-0.1003	-0.0553	0.2054	-0.2595	-0.0021	0.8154
AL-2	0.4712	0.2348	0.1689	1.3900	-0.0599	0.7303
AL-3	0.1660	0.0629	0.1107	0.7484	-0.0174	0.3746
AL-4	-0.3134	-0.4649	0.1951	-2.3743	-0.1334	0.7584
AL-5	-0.1565	-0.0631	0.1230	-0.8723	-0.0140	0.4424
APPLE-1	0.0209	0.3157	0.2106	1.4759	-0.0075	0.8304
APPLE-2	0.0533	0.0474	0.1926	0.2456	-0.0015	0.7658
APPLE-3	-0.4060	-0.1993	0.2615	-0.7622	-0.0180	0.8674
APPLE-4	-0.4730	-0.2353	0.1779	-1.3225	-0.0542	0.7577
APPLE-5	-0.1383	-0.0857	0.2033	-0.3429	-0.0036	0.8094
APPLE-6	-0.3725	-0.1660	0.2176	-0.8577	-0.0228	0.8257
APPLE-7	0.1020	0.0917	0.1861	0.4929	-0.0075	0.7728
APPLE-8	-0.0252	-0.0128	0.1863	-0.0685	-0.0001	0.7718
APPLE-9	-0.4467	-0.2211	0.2353	-0.9395	-0.0274	0.8615
APPLE-10	-0.2391	-0.1196	0.2436	-0.4906	-0.0075	0.8094
APPLE-11	0.0496	0.0247	0.1158	0.2130	-0.0014	0.4274
APPLE-12	-0.2483	-0.2067	0.2366	-1.1273	-0.0394	0.8589
APPLE-13	-0.0267	-0.0267	0.1297	-0.2213	-0.0015	0.5278
APPLE-14	0.1093	0.0544	0.2151	0.2551	-0.0020	0.8312
APPLE-15	-0.2147	-0.1081	0.1422	-0.7604	-0.0179	0.6111
APPLE-16	0.2176	0.1055	0.1914	0.5720	-0.0101	0.7658
APPLE-17	-0.0757	-0.0365	0.1378	-0.2661	-0.0022	0.5903

Table 7.10

Multiple Regression of Residual Scores on Work Diary Variables
Grade 2 Mathematics (N = 37)

THE DEPENDENT VARIABLE IS GMTHGRPS. THE MULTIPLE CORRELATION IS 0.5903. THE STANDARD ERROR OF ESTIMATE= 0.1080

K 2

	SUM OF SQUARES	PROPORTION OF SQUARES	D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		36.			
UNDER NULL HYPOTHESIS	0.5375	1.0000	35.			
DUE TO HYPOTHESIS	0.1873	0.3484	5.	0.0375	3.2083	0.0154
ERROR	0.3502	0.6516	30.	0.0117		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 30 D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
GMTHGRPF		0.7405	0.1106	6.3512		0.1413
INDEPENDENT VARIABLES						
BD-1	-0.2594	-0.1502	0.1208	-1.5744	-0.0538	0.2001
BD-2	0.2510	0.1842	0.1275	1.4446	-0.0453	0.2803
BD-3	-0.2340	-0.1716	0.1112	-1.5431	-0.0517	0.0958
BD-4	-0.4324	-0.3490	0.1249	-2.5378	-0.1399	0.2518
BD-5	-0.2347	-0.1853	0.1211	-1.5305	-0.0509	0.0765

Table 7.11

Regression Parameters for Teaching Performance Variables; Grade 2 Mathematics Residual Scores

Performance Variable	|R|	$\sigma_{y.x}$	df	p	Prop. of SQ.
WD - 1	.19	.08	36	.28	.03
WD - 2	.01	.09	36	.98	.00
WD - 3	.02	.09	36	.90	.00
WD - 4	.43 (.-43)*	.08	36	.01	.18
WD - 5	.06	.09	36	.71	.004
RA - 1	.01	.09	36	.97	.00
RA - 2	.09	.08	36	.59	.01
RA - 3	.16	.08	36	.36	.02
RA - 4	.05	.09	36	.78	.002
AP - 1	.08	.09	36	.65	.01
AP - 2	.10	.08	36	.57	.01
AP - 3	.11	.08	36	.52	.01
AP - 5	.16	.08	36	.34	.03
AP - 6	.17	.08	36	.33	.03
AP - 7	.27 (.-27)	.08	36	.10	.07
AP - 8	.05	.08	36	.77	.002
AP - 9	.12	.08	36	.47	.01
AP - 10	.17	.08	36	.32	.03
AP - 11	.11	.08	36	.54	.01
AP - 12	.12	.08	36	.50	.01
AP - 13	.11	.08	36	.53	.01
AP - 14	.07	.09	36	.68	.01

*Note that column values are the absolute values of R. The sign of R is given for significant R's.

Table 7.12

Stepwise Regression of Residual Scores on Teaching Performance Variables (Step 6)
Grade 2 Mathematics (N = 37)

THE DEPENDENT VARIABLE IS TOTMATHS. THE MULTIPLE CORRELATION IS 0.6725. THE STANDARD ERROR OF ESTIMATE= 0.0683

	SUM OF SQUARES	PROPORTION OF SQUARES	M.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		36.			
UNDER NULL HYPOTHESIS	0.2473	1.0000	35.			
DUE TO HYPOTHESIS	0.1118	0.4522	6.	0.0186	3.9901	0.0050
ERROR	0.1354	0.5478	29.	0.0047		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 29.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOTMATHF		0.7920	0.0715	11.0691		0.0877
INDEPENDENT VARIABLES						
WD-4	-0.3055	-0.2914	0.0826	-3.5273	-0.2350	0.3145
APPLE-7	-0.3578	-0.1791	0.0712	-2.5155	-0.1195	0.0663
APPLE-11	0.3068	0.1526	0.0869	1.7562	-0.0583	0.3812
WD-2	0.3842	0.1914	0.0855	2.2380	-0.0946	0.3589
APPLE-12	-0.2285	-0.1151	0.0782	-1.4714	-0.0409	0.2170
WD-1	-0.2479	-0.1243	0.0859	-1.3828	-0.0361	0.4124
OTHER VARIABLES				NOW 28.D.F.		
RAWS-2	0.0243	0.0123	0.0766	0.1608	0.0005	0.1448
RAWS-3	-0.0391	-0.0195	0.0809	-0.2409	0.0011	0.2596
RAWS-4	-0.0995	-0.0495	0.0775	-0.6389	0.0079	0.2054
APPLE-1	-0.0134	-0.0068	0.0773	-0.0899	0.0002	0.1224
APPLE-2	-0.1182	-0.0592	0.0781	-0.7579	0.0110	0.2115
APPLE-3	-0.0458	-0.0231	0.0802	-0.2879	0.0016	0.2304
APPLE-5	-0.0525	-0.0265	0.0977	-0.2717	0.0014	0.4778
APPLE-6	-0.1070	-0.0532	0.0955	-0.5573	0.0060	0.4749
RAWS-1	0.0727	0.0369	0.0749	0.4920	0.0047	0.1123
APPLE-8	-0.0351	-0.0175	0.0727	-0.2405	0.0011	0.0856
APPLE-9	-0.0081	-0.0041	0.0978	-0.0418	0.0000	0.4789
APPLE-10	-0.1279	-0.0647	0.0785	-0.8249	0.0130	0.2049
WD-3	-0.0261	-0.0130	0.0732	-0.1773	0.0006	0.0973
WD-5	-0.0170	-0.0089	0.0781	-0.1141	0.0003	0.1176
APPLE-13	-0.0652	-0.0328	0.0736	-0.4455	0.0039	0.0925
APPLE-14	-0.1253	-0.0628	0.0887	-0.7078	0.0096	0.3868

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WD-2 measures the amount of content covered. AP-11 described how much the teacher moves among the pupils. Another way to think about the meaning of this relation is to think of AP-11 as a proxy for other variables. Below are its correlations with some other variables:

	AP-11	
WD-1	.55	
R-4	.36	
AP-7	.17	$r = .32$ for $p \leq .05$

AP-7 is included to show that the teacher-class context is not significantly associated with the movements of the teacher. It is, however, correlated with WD-1 (time spent) and R-4 (supervised seatwork). Since we already know that WD-2 (range of content covered) has a positive weight, and for AP-7 and WD-2, $r = .24$ ($p < .20$), it is reasonable to assume that AP-11 is a proxy for teachers who cover more content and spend more time teaching mathematics.

WD-4 (variety of instructional contexts) and AP-7 (teacher-class) define an arrangement which is ineffective. Thus, we know which performances probably should be avoided in teaching second-grade mathematics.

Grade 2 Mathematics - Mean Difference Scores - Multiple Regression

Table 7.13 presents the results of regressing mean difference scores on teaching performances. Again R is not significant. Nor were any R's significant when the variables were grouped by instrument.

Table 7.13

Multiple Regression of Mean Difference Scores on Teaching Performance Variables
Grade 2 Mathematics (N = 37)

CLASS AVE. GAIN ANALYSIS ON DIS. ANALYSIS DATA BASE - GRADE 2 MATH 0

THE DEPENDENT VARIABLE IS TOTMATH , THE MULTIPLE CORRELATION IS 0.7396, THE STANDARD ERROR OF ESTIMATE= 0.1799

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		36.			
UNDER NULL HYPOTHESIS	1.0000	1.0000	36.			
DUE TO HYPOTHESIS	0.5471	0.5471	22.	0.0249	0.7686	0.7181
ERROR	0.4529	0.4529	14.	0.0324		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 14.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
INDEPENDENT VARIABLES						
WD-1	0.0718	0.0718	0.3539	0.2029	-0.0013	0.7417
WD-2	0.3997	0.3997	0.3332	1.1996	-0.0466	0.7085
WD-3	0.2653	0.2653	0.2209	1.2009	-0.0467	0.3371
WD-4	-1.1400	-1.1400	0.4072	-2.7996	-0.2536	0.8049
WD-5	0.5711	0.5711	0.3474	1.6437	-0.0874	0.7320
RAMOS-1	-0.1897	-0.1897	0.5113	-0.3711	-0.0045	0.8762
RAMOS-2	-0.1170	-0.1170	0.3683	-0.3177	-0.0033	0.7615
RAMOS-3	0.4470	0.4470	0.5620	0.7953	-0.0205	0.8976
RAMOS-4	-0.1572	-0.1572	0.3394	-0.4633	-0.0069	0.7191
APPLE-1	-0.2072	-0.2072	0.3902	-0.5311	-0.0091	0.7875
APPLE-2	-0.5587	-0.5587	0.3785	-1.4761	-0.0705	0.7742
APPLE-3	-0.2282	-0.2282	0.3681	-0.6198	-0.0124	0.7613
APPLE-5	-0.7342	-0.7342	0.4914	-1.4943	-0.0722	0.8660
APPLE-6	-0.8919	-0.8919	0.4877	-1.8287	-0.1082	0.8640
APPLE-7	-1.0682	-1.0682	0.5920	-1.8046	-0.1054	0.9077
APPLE-8	0.1275	0.1275	0.2432	0.5240	-0.0089	0.4531
APPLE-9	-0.3623	-0.3623	0.3867	-0.9369	-0.0284	0.7837
APPLE-10	-0.1679	-0.1679	0.2920	-0.5750	-0.0107	0.6205
APPLE-11	-0.0893	-0.0893	0.3683	-0.2425	-0.0019	0.7615
APPLE-12	-0.4999	-0.4999	0.3313	-1.5088	-0.0736	0.7053
APPLE-13	0.4706	0.4706	0.3773	1.2475	-0.0503	0.7727
APPLE-14	-0.0816	-0.0816	0.2856	-0.2855	-0.0026	0.6035

Table 7.14 presents the results of the regressions of mean difference scores on each variable separately. Only WD-4 (variety of instructional contexts) is significant and its regression weight is negative.

Grade 2 Mathematics - Mean Difference Scores - Stepwise Regression

Table 7.15 presents the stepwise regression of mean difference scores against teaching performances. In this analysis, $R = .58$ ($p < .02$), $R^2 = .34$. The variables at Step 5 account for 34 percent of the variance in mean difference scores.

WD-2 (range of content) is a positive predictor. WD-4 (variety of instructional contexts), AP-9 (answering, asking, checking), and AP-2 (inattentiveness) are negative predictors.

Grade 5

The analysis at Grade 5 is also presented in two parts; within each subject area the first analysis is that which used residual scores; the second, mean difference scores. Multiple regressions are presented first, then stepwise regressions in each score category.

Grade 5 Reading - Residual Scores - Multiple Regressions

Table 7.16 presents the multiple regression of residual scores on all teaching performance variables. R is again nonsignificant. No significant R's were found when the variables were grouped by instrument.

Table 7.14

Regression Parameters for Teaching Performance Variables; Grade 2 Mathematics Mean Difference Scores

Performance Variable	|R|	$\sigma_{y.x}$	df	p	Prop. of SQ.
WD - 1	.16	.17	36	.36	.02
WD - 2	.004	.17	36	.98	.00
WD - 3	.06	.17	36	.73	.003
WD - 4	.35 (.-35)*	.16	36	.03	.12
WD - 5	.08	.17	36	.62	.01
RA - 1	.21	.17	36	.21	.04
RA - 2	.18	.17	36	.29	.03
RA - 3	.19	.17	36	.25	.04
RA - 4	.10	.17	36	.56	.01
AP - 1	.05	.17	36	.79	.002
AP - 2	.12	.17	36	.47	.01
AP - 3	.04	.17	36	.81	.001
AP - 5	.05	.17	36	.75	.003
AP - 6	.13	.17	36	.43	.02
AP - 7	.23	.16	36	.16	.05
AP - 8	.09	.17	36	.61	.01
AP - 9	.18	.17	36	.28	.03
AP - 10	.10	.17	36	.55	.01
AP - 11	.09	.17	36	.57	.01
AP - 12	.05	.17	36	.76	.002
AP - 13	.10	.17	36	.55	.01
AP - 14	.09	.17	36	.59	.01

*Note that the column values are the absolute values of R. The sign of R is given for significant R's.

Table 7.15

Stepwise Regression of Mean Difference Scores on Teaching Performance Variables (Step 5)
Grade 2 Mathematics (N = 37)

THE DEPENDENT VARIABLE IS TOTMATH . THE MULTIPLE CORRELATION IS 0.5849. THE STANDARD ERROR OF ESTIMATE= 0.1457

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		36.			
UNDER NULL HYPOTHESIS	1.0000	1.0000	36.			
DUE TO HYPOTHESIS	0.3421	0.3421	5.	0.0684	3.2245	0.0185
ERROR	0.6579	0.6579	31.	0.0212		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 31.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
INDEPENDENT VARIABLES						
WD-4	-0.5659	-0.5659	0.1719	-3.2931	-0.2301	0.2815
APPLE-9	-0.5170	-0.5170	0.1787	-2.8926	-0.1776	0.3357
WD-2	0.3248	0.3248	0.1719	1.8888	-0.0757	0.2822
APPLE-2	-0.3461	-0.3461	0.1796	-1.9266	-0.0788	0.3424
APPLE-1	-0.2481	-0.2481	0.1612	-1.5395	-0.0503	0.1829
OTHER VARIABLES			NOW 30.D.F.			
RAMOS-1	0.0364	0.0364	0.1754	0.2077	0.0009	0.2879
RAMOS-2	-0.0186	-0.0186	0.1650	-0.1129	0.0003	0.1946
RAMOS-3	0.0107	0.0107	0.1623	0.0658	0.0001	0.1674
RAMOS-4	0.0013	0.0013	0.1533	0.0082	0.0000	0.0674
WD-5	0.0150	0.0150	0.1853	0.0812	0.0001	0.3614
WD-1	-0.0498	-0.0498	0.1655	-0.3007	0.0020	0.2019
APPLE-3	-0.1035	-0.1035	0.1880	-0.5506	0.0066	0.3855
APPLE-5	0.0490	0.0490	0.1754	0.2797	0.0017	0.2889
APPLE-6	-0.1415	-0.1415	0.1743	-0.8117	0.0141	0.2936
APPLE-7	-0.0300	-0.0300	0.1829	-0.1641	0.0006	0.3454
APPLE-8	-0.0219	-0.0219	0.1499	-0.1462	0.0005	0.0243
WD-3	0.0651	0.0651	0.1510	0.4308	0.0040	0.0447
APPLE-10	-0.0384	-0.0384	0.1618	-0.2375	0.0012	0.1641
APPLE-11	0.0386	0.0386	0.1601	0.2412	0.0013	0.1460
APPLE-12	-0.1590	-0.1590	0.1702	-0.9345	0.0186	0.2644
APPLE-13	0.0856	0.0856	0.1774	0.4827	0.0051	0.3088
APPLE-14	-0.0011	-0.0011	0.1574	-0.0073	0.0000	0.1146

Table 7.16

Multiple Regression of Residual Scores on Teaching Performances
Grade 5 Reading (N = 41)

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FM. DEPENDENT VARIABLE IS TOTREADS. THE MULTIPLE CORRELATION IS 0.7156. THE STANDARD ERROR OF ESTIMATE= 0.0604

	SUM OF SQUARES	PROPORTION OF SQUARES	D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		41.			
UNDER NULL HYPOTHESIS	0.1347	1.0000	40.			
DUE TO HYPOTHESIS	0.0090	0.5121	22.	0.0031	0.8589	0.6368
ERROR	0.0657	0.4879	18.	0.0037		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 18 D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOTREADF		0.8943	0.0881	10.1532		0.5295
INDEPENDENT VARIABLES						
AD-1	-0.2650	-0.0978	0.0948	-1.0316	-0.0288	0.5894
AD-2	0.1058	0.0391	0.1116	0.3500	-0.0033	0.7032
AD-3	0.1317	-0.0502	0.0817	0.6139	-0.0102	0.4113
AD-4	0.0144	0.0053	0.0929	0.0568	-0.0001	0.5767
AD-5	0.2512	-0.0931	0.1079	-0.8627	-0.0202	0.6803
RAMUS-1	0.1367	0.0512	0.1046	0.4895	-0.0065	0.5626
RAMUS-2	-0.1678	-0.0618	0.1042	0.5935	-0.0095	0.6607
RAMUS-3	-0.5217	-0.1927	0.1194	1.6140	-0.0706	0.7406
RAMUS-4	0.5207	0.1928	0.1228	1.5692	-0.0667	0.7539
APPLE-1	-0.3140	-0.1186	0.0792	-1.1950	-0.0387	0.6074
APPLE-2	-0.3028	-0.1121	0.1362	-0.8225	-0.0183	0.8000
APPLE-3	0.0179	0.0067	0.1469	0.0459	-0.0001	0.8226
APPLE-5	-0.2379	-0.0877	0.1361	-0.6441	-0.0112	0.8013
APPLE-6	0.0906	0.0357	0.1607	0.2219	-0.0013	0.8374
APPLE-7	0.3351	-0.1292	0.1508	-0.8563	-0.0199	0.8230
APPLE-8	-0.2253	-0.0827	0.0344	-0.9797	-0.0260	0.4874
APPLE-9	0.0492	0.0181	0.0352	0.2098	-0.0012	0.5077
APPLE-10	0.3279	0.1211	0.0869	1.3625	-0.0503	0.5320
APPLE-11	0.2546	0.0864	0.1058	0.8167	-0.0181	0.6717
APPLE-12	0.1144	0.0421	0.0944	0.4462	-0.0054	0.5878
APPLE-13	-0.0738	-0.0271	0.0962	-0.2821	-0.0022	0.6043
APPLE-14	-0.0654	-0.0240	0.0840	-0.2857	-0.0022	0.4825

Table 7.17 presents the regression of residual scores on each teaching performance variable. WD-1, R-3, and AP-8 are negative predictors when added to the fall scores' component in a regression equation. This group suggests a pattern. AP-8 represents the amount of organizing to instruct and of facilitating task-performance. It does not represent the amount of instructing. WD-1 is a time-spent variable; it is total instructional time invested by the teacher or reported by the teacher. It seems that if a substantial proportion of this time is devoted to organizing rather than instructing, learning is less (lower residual scores). R-3 (variety of materials) may reflect AP-8 (organizing). The more materials the teacher uses, the more organizing she or he has to do. WD-1 is correlated with WD-4 (variety of instructional contexts); r = .30. WD-1 may be a proxy for WD-4 in this analysis. AP-8 as a negative predictor then makes even more sense because teachers with a pattern of high scores on WD-4 may be spending more time organizing (AP-8), and time spent in this way is counted by them as time spent teaching, WD-1. Thus, there are some teachers who organize instruction poorly, and, as a consequence, have less time for instruction. Therefore, their pupils learn less. This reasoning seems to support a hypothesis worth testing.

Table 7.17

Regression Parameters for Teaching Performance Variables; Grade 5 Reading Residual Scores

Performance Variable	|R|	$\sigma_{y.x}$	df	p	Prop. of SQ.
WD - 1	.24 (-.24)*	.05	52	.08	.001
WD - 2	.04	.05	52	.79	.001
WD - 3	.09	.05	52	.51	.01
WD - 4	.07	.05	52	.62	.004
WD - 5	.15	.05	52	.27	.02
RA - 1	.10	.05	52	.47	.01
RA - 2	.20	.05	52	.16	.04
RA - 3	.24 (-.24)	.05	52	.08	.06
RA - 4	.04	.05	52	.79	.001
AP - 1	.002	.05	52	.99	.00
AP - 2	.23	.05	52	.11	.05
AP - 3	.07	.05	52	.64	.004
AP - 5	.12	.05	52	.41	.01
AP - 6	.02	.05	52	.87	.00
AP - 7	.08	.05	52	.59	.01
AP - 8	.28 (-.28)	.05	52	.04	.08
AP - 9	.18	.05	52	.19	.03
AP - 10	.22	.05	52	.11	.05
AP - 11	.01	.05	52	.95	.00
AP - 12	.06	.05	52	.68	.003
AP - 13	.17	.05	52	.22	.003
AP - 14	.09	.05	52	.54	.007

*Note that column values are the absolute values of R. The sign of R is given for significant R's.

Grade 5 Reading - Residual Scores - Stepwise Regression

Table 7.18 presents the stepwise regression of residual scores on teaching performances. $R = .59$, $R^2 = .35$, and the six variables account for 35 percent of the variance in residual scores.

R-4 (supervised independent seatwork) is a positive predictor. AP-2 (inattentiveness), AP-8 (organizing), WD-1 (time spent), R-3 (variety of materials) and AP-1 (pupil productivity in class) are negative predictors. AP-8's regression weight approaches significance.

The negative predictors represent more clearly the pattern described above. AP-2 (inattentiveness) represents, perhaps, the effects of a teacher's difficulties in organizing. We have previously pointed out that AP-1 is not an indicator of how much the child knows or is learning. AP-1's correlation with residual scores is zero, $r = .05$. AP-1 is more likely a reflection of or proxy for the teacher's instructional techniques. The correlation, for example, between AP-12 (responsiveness to pupils) and AP-1 is .38.

Grade 5 Reading - Mean Difference Scores - Multiple Regressions

Table 7.19 presents the results of regressing mean difference scores on the teaching performance variables. Again R is not significant. None of the analyses of the groupings by instrument yielded significant R's.

Table 7.20 presents the regressions by single variable. AP-2 (inattentiveness) and AP-8 (organizing) are negative predictors.

Table 7.18

Stepwise Regression of Residual Scores on Teaching Performances (Step 6)
Grade 5 Reading (N = 41)

THE DEPENDENT VARIABLE IS TOTREADS. THE MULTIPLE CORRELATION IS 0.5876. THE STANDARD ERROR OF ESTIMATE= 0.0509

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		41.			
UNDER NULL HYPOTHESIS	0.1547	1.0000	40.			
DUE TO HYPOTHESIS	0.0465	0.3452	6.	0.0077	2.9877	0.0188
ERROR	0.0882	0.6548	34.	0.0026		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 34.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOTREADF		0.8757	0.0576	15.1989		0.2187
INDEPENDENT VARIABLES						
APPLE-2	-0.3977	-0.1472	0.0554	-2.6573	-0.1360	0.1403
APPLE-8	-0.2491	-0.0914	0.0616	-1.4832	-0.0424	0.3175
WD-1	-0.2428	-0.0896	0.0527	-1.7014	-0.0558	0.0540
RAMOS-3	-0.4479	-0.1655	0.0728	-2.2724	-0.0994	0.5043
RAMOS-4	0.4314	0.1597	0.0780	2.0461	-0.0806	0.5667
APPLE-1	-0.2693	-0.1017	0.0631	-1.6118	-0.0500	0.3100
OTHER VARIABLES				NOW 33.D.F.		
RAMOS-2	0.0512	0.0189	0.0725	0.2601	0.0013	0.4890
WD-4	-0.0186	-0.0068	0.0629	-0.1085	0.0002	0.3234
WD-5	-0.1153	-0.0427	0.0537	0.7955	0.0123	0.0740
RAMOS-1	0.0090	0.0033	0.0709	0.0470	0.0000	0.4632
WD-3	-0.0832	-0.0317	0.0544	-0.5821	0.0067	0.0380
APPLE-3	-0.0469	-0.0176	0.0836	-0.2108	0.0009	0.5994
APPLE-5	-0.0903	-0.0333	0.0640	-0.5203	0.0053	0.3464
APPLE-6	0.1696	0.0667	0.0684	0.9754	0.0183	0.3618
APPLE-7	-0.1560	-0.0601	0.0606	-0.9914	0.0189	0.2215
WD-2	0.0360	0.0133	0.0584	0.2276	0.0010	0.2073
APPLE-9	0.0893	0.0328	0.0584	0.5518	0.0062	0.2220
APPLE-10	0.1138	0.0420	0.0540	0.7782	0.0118	0.0393
APPLE-11	0.0957	0.0352	0.0584	0.6034	0.0071	0.2191
APPLE-12	-0.0287	-0.0106	0.0563	-0.1877	0.0007	0.1510
APPLE-13	-0.1597	-0.0587	0.0550	-1.0668	0.0218	0.1440
APPLE-14	-0.0662	-0.0243	0.0537	-0.4531	0.0040	0.0767

561

Table 7.19

Multiple Regression of Mean Difference Scores on Teaching Performance Variables
Grade 5 Reading (N = 41)

CLASS AVE. GAIN ANALYSIS ON DISCRIMINATE ANAL. DATA BASE -GRADE 5 READING

THE DEPENDENT VARIABLE IS TOTREAD , THE MULTIPLE CORRELATION IS 0.6990, THE STANDARD ERROR OF ESTIMATE= 0.1641

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		41.			
UNDER NULL HYPOTHESIS	1.0000	1.0000	41.			
DUE TO HYPOTHESIS	0.4886	0.4886	22.	0.0222	0.8250	0.6703
ERROR	0.5114	0.5114	19.	0.0269		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 19.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
INDEPENDENT VARIABLES						
WD-1	-0.2894	-0.2894	0.2457	-1.1780	-0.0374	0.5539
WD-2	0.2696	0.2696	0.2824	0.9548	-0.0245	0.6624
WD-3	-0.2257	-0.2257	0.2108	-1.0706	-0.0309	0.3945
WD-4	0.1276	0.1276	0.2466	0.5176	-0.0072	0.5572
WD-5	-0.2135	-0.2135	0.2901	-0.7360	-0.0146	0.6801
RAMOS-1	0.2355	0.2355	0.2778	0.8478	-0.0193	0.6512
RAMOS-2	-0.0762	-0.0762	0.2845	-0.2680	-0.0019	0.6674
RAMOS-3	-0.5044	-0.5044	0.3224	-1.5644	-0.0659	0.7411
RAMOS-4	0.3442	0.3442	0.3385	1.0167	-0.0278	0.7652
APPLE-1	-0.3508	-0.3508	0.2694	-1.3024	-0.0457	0.6290
APPLE-2	-0.3350	-0.3350	0.3778	-0.8856	-0.0212	0.8114
APPLE-3	-0.1239	-0.1239	0.3836	-0.3230	-0.0028	0.8171
APPLE-5	-0.1591	-0.1591	0.3767	-0.4222	-0.0048	0.8103
APPLE-6	0.1939	0.1939	0.4159	0.4661	-0.0058	0.8444
APPLE-7	-0.3329	-0.3329	0.4178	-0.7968	-0.0171	0.8458
APPLE-8	-0.1840	-0.1840	0.2272	-0.8099	-0.0177	0.4705
APPLE-9	-0.0237	-0.0237	0.2342	-0.1014	-0.0003	0.5094
APPLE-10	0.2636	0.2636	0.2400	1.0988	-0.0325	0.5325
APPLE-11	0.1747	0.1747	0.2831	0.6171	-0.0102	0.6642
APPLE-12	0.2082	0.2082	0.2544	0.8184	-0.0180	0.5840
APPLE-13	-0.1654	-0.1654	0.2509	-0.6592	-0.0117	0.5723
APPLE-14	-0.0787	-0.0787	0.2146	-0.3669	-0.0036	0.4152

Table 7.20

Regression Parameters for Teaching Performance Variables; Grade 5 Reading Mean Difference Scores

Performance Variable	|R|	$\sigma_{y.x}$	df	p	Prop. of SQ.
WD - 1	.19	.15	41	.22	.04
WD - 2	.16	.15	41	.31	.03
WD - 3	.07	.15	41	.66	.004
WD - 4	.17	.15	41	.28	.03
WD - 5	.13	.15	41	.40	.02
RA - 1	.17	.15	41	.28	.03
RA - 2	.11	.15	41	.49	.01
RA - 3	.24	.15	41	.13	.06
RA - 4	.06	.15	41	.69	.004
AP - 1	.01	.16	41	.94	.00
AP - 2	.29 (-.29)*	.15	41	.06	.09
AP - 3	.24	.15	41	.12	.06
AP - 5	.16	.15	41	.31	.03
AP - 6	.12	.16	41	.45	.01
AP - 7	.03	.16	41	.87	.00
AP - 8	.28 (-.28)	.15	41	.07	.08
AP - 9	.19	.15	41	.23	.04
AP - 10	.16	.16	41	.30	.03
AP - 11	.03	.16	41	.85	.00
AP - 12	.07	.16	41	.64	.01
AP - 13	.22	.15	41	.15	.05
AP - 14	.09	.16	41	.57	.01

*Note that column values are the absolute values of R. The sign of R is given for significant R's.

AP-2 and AP-8 are not correlated (r = .08). AP-2 tends to be associated with AP-13 (social control), for which r = .28 (p < .10). If a teacher had high scores on both AP-2 and AP-13, we would predict a mean difference score in the lower range for his or her class.

Grade 5 Reading - Mean Difference Scores - Stepwise Regression

Table 7.21 presents the regression of mean difference scores on teaching performances at Step 2. F-values decrease after this step. R = .39 (p = .04) and R^2 = .15. These same two variables (AP-2 and AP-8) are predicting 15 percent of the variance in mean difference scores.

Grade 5 Mathematics - Residual Scores - Multiple Regressions

Table 7.22 presents the results of regressing residual scores against all the performance variables. R = .80 and approaches significance, p = .12. Only the WD-variables when grouped yield an R approaching significance (p = .0555). In that analysis WD-4 has a positive and significant regression weight.

Table 7.23 presents the results of regressing residual scores against each performance variable. WD-4 (variety of instructional contexts) is significant and is positive. WD-4 alone accounts for 15 percent of the variance in residual scores. Since fall scores account for 95 percent of the variance, the addition of WD-4

Table 7.21

Stepwise Regression of Mean Difference Scores on Teaching Performances (Step2)
Grade 5 Reading (N = 41)

CLASS AVE. GAIN ANALYSIS ON DISCRIMINATE ANAL. DATA BASE -GRADE 5 READINV

THE DEPENDENT VARIABLE IS TOTREAD . THE MULTIPLE CORRELATION IS 0.3904. THE STANDARD ERROR OF ESTIMATE= 0.1474

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		41.			
UNDER NULL HYPOTHESIS	1.0000	1.0000	41.			
DUE TO HYPOTHESIS	0.1524	0.1524	2.	0.0762	3.5062	0.0398
ERROR	0.8476	0.8476	39.	0.0217		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 39.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
INDEPENDENT VARIABLES						
APPLE-2	-0.2706	-0.2706	0.1480	-1.8288	-0.0727	0.0072
APPLE-8	-0.2594	-0.2594	0.1480	-1.7534	-0.0668	0.0072
OTHER VARIABLES				NOW 38.D.F.		
WD-3	-0.0689	-0.0689	0.1499	-0.4593	0.0047	0.0130
WD-4	0.1181	0.1181	0.1643	0.7196	0.0114	0.1848
WD-5	-0.1201	-0.1201	0.1485	-0.8090	0.0144	0.0055
RAWCS-1	-0.0337	-0.0337	0.1657	-0.2034	0.0009	0.1881
RAWCS-2	-0.0207	-0.0207	0.1557	-0.1330	0.0004	0.0803
RAWCS-3	-0.1767	-0.1767	0.1660	-1.0650	0.0246	0.2136
RAWCS-4	0.0790	0.0750	0.1746	0.4526	0.0045	0.2722
APPLE-1	-0.0965	-0.0965	0.1583	-0.6099	0.0032	0.1160
WD-1	-0.1924	-0.1924	0.1483	-1.2977	0.0360	0.0282
APPLE-3	0.0636	0.0636	0.1974	0.3221	0.0023	0.4294
APPLE-5	-0.1059	-0.1059	0.1705	-0.6212	0.0085	0.2403
APPLE-6	0.0762	0.0762	0.1552	0.4911	0.0053	0.0799
APPLE-7	-0.0002	-0.0002	0.1502	-0.0013	0.0000	0.0111
WD-2	0.0947	0.0947	0.1510	0.6270	0.0087	0.0323
APPLE-9	0.0581	0.0581	0.1599	0.3633	0.0029	0.1302
APPLE-10	0.1180	0.1180	0.1493	0.7904	0.0137	0.0160
APPLE-11	0.0638	0.0638	0.1591	0.4008	0.0036	0.1226
APPLE-12	-0.0105	-0.0105	0.1544	-0.0682	0.0001	0.0643
APPLE-13	-0.1618	-0.1618	0.1535	-1.0541	0.0241	0.0805
APPLE-14	-0.0734	-0.0734	0.1496	-0.4905	0.0053	0.0100

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Table 7.22

Multiple Regression of Residual Scores on Teaching Performances
Grade 5 Mathematics (N = 45)

D

THE DEPENDENT VARIABLE IS TOTMATHS. THE MULTIPLE CORRELATION IS 0.7987. THE STANDARD ERROR OF ESTIMATE= 0.0471

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		44.			
UNDER NULL HYPOTHESIS	0.1285	1.0000	43.			
DUE TO HYPOTHESIS	0.0820	0.6379	22.	0.0037	1.6814	0.1194
ERROR	0.0465	0.3621	21.	0.0022		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 21.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOTMATHF		1.0262	0.0714	14.3687		0.5657
INDEPENDENT VARIABLES						
WD-1	-0.2529	-0.0907	0.0746	-1.2145	-0.0254	0.6023
WD-2	-0.2847	-0.1030	0.1251	-0.8235	-0.0117	0.8557
WD-3	0.1927	0.0706	0.0713	0.9893	-0.0169	0.5456
WD-4	0.8143	0.2933	0.0963	3.0462	-0.1600	0.7587
WD-5	-0.3668	-0.1415	0.0728	-1.9441	-0.0652	0.5157
RAMOS-1	-0.4916	-0.1775	0.1010	-1.7570	-0.0532	0.7797
RAMOS-2	0.3919	0.1410	0.1301	1.0836	-0.0202	0.8682
RAMOS-3	-0.4206	-0.1569	0.1231	-1.2254	-0.0259	0.8556
RAMOS-4	0.0536	0.0193	0.1176	0.1639	-0.0005	0.8386
APPLE-1	0.1890	0.0678	0.0823	0.8236	-0.0117	0.6725
APPLE-2	-0.3197	-0.1153	0.0789	-1.4616	-0.0368	0.6396
APPLE-3	-0.1306	-0.0465	0.0739	-0.6343	-0.0069	0.5934
APPLE-5	0.1673	0.0600	0.0730	0.7690	-0.0102	0.6355
APPLE-6	0.2833	0.1029	0.0923	1.1141	-0.0214	0.7334
APPLE-7	0.2568	0.0932	0.0669	1.3929	-0.0335	0.4925
APPLE-8	-0.1386	-0.0497	0.0670	-0.7417	-0.0095	0.5061
APPLE-9	-0.1731	-0.0621	0.0808	-0.7683	-0.0102	0.6601
APPLE-10	0.3756	0.1356	0.0713	1.9032	-0.0525	0.5573
APPLE-11	0.2085	0.0751	0.0679	1.1052	-0.0211	0.5157
APPLE-12	-0.0471	-0.0177	0.0954	-0.1855	-0.0006	0.7320
APPLE-13	0.3971	0.1428	0.0604	2.3628	-0.0963	0.3696
APPLE-14	-0.0913	-0.0328	0.0742	-0.4417	-0.0034	0.5960

Table 7.23

Regression Parameters for Teaching Performance Variables
Grade 5 Mathematics - Residual Scores

Performance Variable	R	$\sigma_{y.x}$	df	p	Prop. of SQ.
WD - 1	.08	.05	44	.66	.004
WD - 2	.21	.05	44	.16	.05
WD - 3	.08	.05	44	.62	.01
WD - 4	.38	.05	44	.01	.15
WD - 5	.11	.05	44	.46	.01
RA - 1	.08	.05	44	.59	.01
RA - 2	.03	.05	44	.83	.001
RA - 3	.11	.05	44	.46	.01
RA - 4	.03	.05	44	.85	.00
AP - 1	.10	.05	44	.51	.01
AP - 2	.24	.05	44	.12	.06
AP - 3	.04	.05	44	.80	.001
AP - 5	.22	.05	44	.16	.05
AP - 6	.09	.05	44	.58	.01
AP - 7	.13	.05	44	.39	.02
AP - 8	.24	.05	44	.11	.06
AP - 9	.11	.05	44	.48	.01
AP - 10	.22	.05	44	.15	.05
AP - 11	.03	.05	44	.86	.00
AP - 12	.18	.05	44	.24	.03
AP - 13	.06	.05	44	.70	.003
AP - 14	.10	.05	44	.51	.01

accounts for all of the variance in residual scores (refer to Table 7.24). The regression equation is:

$$Y' = .9469\ X_f + .1382\ WD\text{-}4$$

Grade 5 Mathematics - Residual Scores - Stepwise Regression

Tables 7.24 and 7.25 present the stepwise regressions of residual scores against the performance variables. At Step 7 (Table 7.25), the R is highly significant; R = .70, $p \leq .001$. $R^2 = .49$, so these seven variables account for 49 percent of the variance in residual scores.

The positive predictors are WD-4 (variety of instructional contexts), AP-10 (developing pupils' understanding) and AP-13 (social control). The negative predictors are WD-1 (time spent), AP-2 (inattentiveness) and R-3 (variety of materials). AP-8 (organizing) is negative and approaches significance.

We have seen these patterns before. The positive predictors represent a pattern of teaching in which the teacher uses varied instructional contexts (WD-4), engages in a variety of teaching activities such as discussing and explaining and questioning (AP-10), and maintains task orientation (AP-13).

The negative predictors represent a pattern in which the teacher uses a variety of materials (R-3) and spends more time organizing for instruction (AP-8), and whose classes are characterized by inattentiveness (AP-2). WD-1 is a variable that

Table 7.24

Stepwise Regression of Residual Scores on Teaching Performances (Step 1)
Grade 5 Mathematics (N = 45)

THE DEPENDENT VARIABLE IS TOTMATHS. THE MULTIPLE CORRELATION IS 0.3838. THE STANDARD ERROR OF ESTIMATE= 0.0511

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		44.			
UNDER NULL HYPOTHESIS	0.1285	1.0000	43.			
DUE TO HYPOTHESIS	0.0189	0.1473	1.	0.0189	7.2550	0.0101
ERROR	0.1096	0.8527	42.	0.0026		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 42.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOTMATHF		0.9469	0.0513	18.4531		0.0094
INDEPENDENT VARIABLES						
WD-4	0.3838	0.1382	0.0513	2.6935	-0.1473	0.0

Table 7.25

Stepwise Regression of Residual Scores on Teaching Performances (Step 7)
Grade 5 Mathematics (N = 45)

THE DEPENDENT VARIABLE IS TOTMATHS. THE MULTIPLE CORRELATION IS 0.6965. THE STANDARD ERROR OF ESTIMATE= 0.0429

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		44.			
UNDER NULL HYPOTHESIS	0.1285	1.0000	43.			
DUE TO HYPOTHESIS	0.0623	0.4852	7.	0.0089	4.8467	0.0006
ERROR	0.0661	0.5148	36.	0.0018		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 36.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOTMATHF		0.9222	0.0441	20.9173		0.0546
INDEPENDENT VARIABLES						
WD-4	0.5764	0.2076	0.0483	4.2953	-0.2638	0.2059
APPLE-10	0.4526	0.1634	0.0490	3.3364	-0.1592	0.2228
APPLE-8	-0.1610	-0.0577	0.0440	-1.3138	-0.0247	0.0473
WD-1	-0.2981	-0.1068	0.0474	-2.2537	-0.0726	0.1824
APPLE-2	-0.2458	-0.0887	0.0480	-1.8465	-0.0488	0.1930
APPLE-13	0.3130	0.1125	0.0501	2.2454	0.0721	0.2641
RAMOS-3	-0.2500	-0.0897	0.0540	-1.6606	-0.0394	0.3692
OTHER VARIABLES				NOW 35.D.F.		
RAMOS-2	0.0962	0.0346	0.0627	0.5518	0.0044	0.5200
RAMOS-4	0.0712	0.0256	0.0679	0.3772	0.0021	0.5885
APPLE-1	-0.0395	-0.0142	0.0495	-0.2862	0.0012	0.2308
WD-5	-0.1628	-0.0628	0.0507	-1.2377	0.0216	0.1852
APPLE-3	-0.0028	-0.0010	0.0552	-0.0181	0.0000	0.3 17
APPLE-5	0.0957	0.0343	0.0573	0.5984	0.0052	0.4311
APPLE-6	0.1380	0.0501	0.0535	0.9362	0.0126	0.3395
APPLE-7	0.0675	0.0245	0.0463	0.5300	0.0041	0.1009
WD-3	0.0260	0.0095	0.0483	0.1972	0.0006	0.1565
APPLE-9	-0.0585	-0.0210	0.0479	-0.4386	0.0028	0.1788
WD-2	0.0773	0.0280	0.0612	0.4575	0.0031	0.4882
APPLE-11	0.0551	0.0198	0.0468	0.4232	0.0026	0.1352
APPLE-12	0.0887	0.0334	0.0491	0.6797	0.0067	0.1480
RAMOS-1	-0.1176	-0.0424	0.0601	-0.7060	0.0072	0.4770
APPLE-14	-0.0221	-0.0080	0.0505	-0.1574	0.0004	0.2514

correlates with WD-3 (range of content) and WD-4 (varied instructional contexts). WD-4 is a positive predictor and by itself accounts for 15 percent of the variance in residual scores. Thus in a stepwise regression, WD-4, which was entered first, may simply make WD-1, which is correlated with it, negative.

Grade 5 Mathematics - Mean Difference Scores - Multiple Regressions

Table 7.26 presents the multiple regression of mean difference scores on all the variables. R is not significant. None of the groupings by instrument or within the APPLE variables yielded a significant R.

Table 7.27 presents the results of regressing mean difference scores against each variable. WD-4 (variety of instructional contexts) is significant and positive and accounts for 11 percent of the variance in mean difference scores by itself. AP-2 (inattentiveness) is negative and significant and accounts for eight percent of the variance. AP-5 (independent work) is also negative and significant and accounts for seven percent of the variance in mean difference scores.

Grade 5 Mathematics - Mean Difference Scores - Stepwise Regression

Table 7.28 presents the results of the stepwise regression of mean difference scores on the performance variables at Step 7. In this analysis, R = .65 (p = .01) and R^2 = .42 which means that the seven predictor variables account for 42 percent of the variance

Table 7.26

Multiple Regression of Mean Difference Scores on Teaching Performance Variables
Grade 5 Mathematics (N = 45)

CLASS AVE. GAIN ANALYSIS ON DIS. ANALYSIS DATA BASE - GRADE 5 MATH D

THE DEPENDENT VARIABLE IS TOTMATH . THE MULTIPLE CORRELATION IS 0.7542. THE STANDARD ERROR OF ESTIMATE= 0.1400

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		44.			
UNDER NULL HYPOTHESIS	1.0000	1.0000	44.			
DUE TO HYPOTHESIS	0.5688	0.5688	22.	0.0259	1.3190	0.2608
ERROR	0.4312	0.4312	22.	0.0196		

INDEPENDENT VARIABLES	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 22.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
WD-1	-0.2985	-0.2985	0.2213	-1.3487	-0.0357	0.5999
WD-2	-0.1135	-0.1135	0.3342	-0.3398	-0.0023	0.8245
WD-3	0.0752	0.0752	0.2080	0.3614	-0.0026	0.5471
WD-4	0.8989	0.8989	0.4272	2.1043	-0.0868	0.8926
WD-5	-0.2695	-0.2695	0.2834	-0.9513	-0.0177	0.7559
RAMOS-1	-0.2217	-0.2217	0.3329	-0.6660	-0.0087	0.8232
RAMOS-2	0.4265	0.4265	0.3837	1.1114	-0.0242	0.8669
RAMOS-3	-0.3248	-0.3248	0.3573	-0.9090	-0.0162	0.8464
RAMOS-4	-0.1771	-0.1771	0.3387	-0.5229	-0.0054	0.8291
APPLE-1	-0.0608	-0.0608	0.2466	-0.2464	-0.0012	0.6777
APPLE-2	-0.3790	-0.3790	0.2314	-1.6377	-0.0526	0.6340
APPLE-3	-0.1610	-0.1610	0.2224	-0.7241	-0.0103	0.6036
APPLE-5	0.0326	0.0326	0.2569	0.1271	-0.0005	0.7029
APPLE-6	0.4387	0.4387	0.2681	1.6363	-0.0525	0.7273
APPLE-7	0.2441	0.2441	0.1978	1.2342	-0.0299	0.4991
APPLE-8	-0.1516	-0.1516	0.2018	-0.7513	-0.0111	0.5189
APPLE-9	-0.0881	-0.0881	0.2194	-0.4015	-0.0032	0.5929
APPLE-10	0.2673	0.2673	0.2068	1.2928	-0.0328	0.5415
APPLE-11	0.2224	0.2224	0.1984	1.1213	-0.0246	0.5018
APPLE-12	-0.1584	-0.1584	0.2734	-0.5794	-0.0066	0.7377
APPLE-13	0.3588	0.3588	0.1868	1.9206	-0.0723	0.4385
APPLE-14	-0.0089	-0.0089	0.2191	-0.0405	-0.0000	0.5915

Table 7.27

Regression Parameters for Teaching Performance Variables; Grade 5 Mathematics Mean Difference Scores

Performance Variable	|R|	$\sigma_{y.x}$	df	p	Prop. of SQ.
WD - 1	.08	.15	44	.59	.01
WD - 2	.19	.15	44	.20	.04
WD - 3	.09	.15	44	.58	.01
WD - 4	.34	.14	44	.02	.11
WD - 5	.24	.15	44	.11	.06
RA - 1	.15	.15	44	.32	.02
RA - 2	.04	.15	44	.77	.002
RA - 3	.15	.15	44	.32	.02
RA - 4	.03	.15	44	.82	.001
AP - 1	.13	.15	44	.39	.02
AP - 2	.29 (-.29)*	.15	44	.05	.08
AP - 3	.02	.15	44	.92	.00
AP - 5	.26 (-.26)	.15	44	.09	.07
AP - 6	.09	.15	44	.57	.01
AP - 7	.11	.15	44	.49	.01
AP - 8	.24	.15	44	.11	.06
AP - 9	.13	.15	44	.38	.02
AP - 10	.11	.15	44	.47	.01
AP - 11	.09	.15	44	.55	.01
AP - 12	.09	.15	44	.53	.01
AP - 13	.09	.15	44	.55	.01
AP - 14	.12	.15	44	.43	.01

*Note that the column values are the absolute values of R. The sign of R is given for significant R's.

Table 7.28

Stepwise Regression of Mean Difference Scores on Teaching Performances (Step 7)
Grade 5 Matnematics (N = 45)

CLASS AVE. GAIN ANALYSIS ON DIS. ANALYSIS DATA BASE - GRADE 5 MATH U

THE DEPENDENT VARIABLE IS TOTMATH , THE MULTIPLE CORRELATION IS 0.6512. THE STANDARD ERROR OF ESTIMATE= 0.1248

	SUM OF SQUARES	PROPORTION OF SQUARES	M.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		44.			
UNDER NULL HYPOTHESIS	1.0000	1.0000	44.			
DUE TO HYPOTHESIS	0.4241	0.4241	7.	0.0606	3.8924	0.0029
ERROR	0.5759	0.5759	37.	0.0156		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 37.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
INDEPENDENT VARIABLES						
WD-4	0.5324	0.5324	0.1429	3.7259	-0.2161	0.2377
APPLE-8	-0.2160	-0.2160	0.1354	-1.5956	-0.0396	0.1509
APPLE-6	0.2692	0.2692	0.1411	1.9079	-0.0567	0.2184
WD-1	-0.3166	-0.3166	0.1390	-2.2786	-0.0808	0.1938
APPLE-2	-0.3047	-0.3047	0.1408	-2.1644	-0.0729	0.2146
APPLE-13	0.2676	0.2676	0.1346	1.9872	-0.0615	0.1414
APPLE-1	-0.2297	-0.2297	0.1336	-1.7186	-0.0460	0.1284
OTHER VARIABLES				NOW 36.D.F.		
RANDS-3	-0.0965	-0.0965	0.1526	-0.6322	0.0063	0.3202
RANDS-4	-0.0718	-0.0718	0.1386	-0.5180	0.0043	0.1740
RANDS-2	0.0258	0.0258	0.1335	0.1932	0.0006	0.1030
WD-5	-0.1985	-0.1985	0.1972	-1.0067	0.0158	0.5999
APPLE-3	-0.0531	-0.0531	0.1489	-0.3568	0.0020	0.2808
APPLE-5	0.0590	0.0590	0.1679	0.3513	0.0020	0.4347
WD-3	0.0053	0.0053	0.1305	0.0385	0.0000	0.1665
APPLE-7	0.1148	0.1148	0.1395	0.8229	0.0106	0.1929
WD-2	-0.0177	-0.0177	0.1759	-0.1008	0.0002	0.4032
APPLE-9	-0.0396	-0.0396	0.1444	-0.2740	0.0012	0.2341
APPLE-10	0.1460	0.1460	0.1451	1.0062	0.0158	0.2606
APPLE-11	0.1595	0.1595	0.1364	1.1691	0.0211	0.1715
APPLE-12	0.0221	0.0221	0.1511	0.1460	0.0003	0.2997
RANDS-1	0.0642	0.0642	0.1658	0.3870	0.0024	0.4203
APPLE-14	-0.0246	-0.0246	0.1473	-0.1670	0.0004	0.2635

in mean difference scores. WD-4 (variety of instructional contexts), AP-6 (teacher-group) and AP-13 (social control) are positive predictors. A teacher with high scores on these variables works with students in groups, does most of the instructing and, maintains control of student behavior by redirecting their behavior in ways that do not disrupt the ongoing instructional process (AP-13 is weighted by redirecting responses).

The negative predictors are AP-1 (pupil productivity), AP-2 (pupil inattentive behavior), and WD-1 (time spent). AP-8 (organizing) approaches significance. High scores on these variables suggest a pattern in which more of the teaching time was occupied with organizing instruction than with instructing. In classes of teachers with high AP-8 scores pupils may have been productive (AP-1) during the instructing times, but were probably inattentive during the organizational times.

AP-1, pupil productivity, has a positive correlation with AP-12 (responsiveness to pupils); $\underline{r} = .38$, and, hence, probably is a consequence of the teacher's interaction with pupils. Since there is a suspicion that teachers are more likely to call on students who know the "right answers," an observer will see more AP-1 behavior in some classes, but the classes' learning may not be markedly affected. This conjecture is supported by the correlation between AP-1 and mean difference scores for which $\underline{r} = -.13$.

Summary and Interpretation of Grade 2 and Grade 5 Results

The most meaningful way to interpret the results of these analyses is to look at the percentage of variance accounted for by the significant predictors. The table below presents these results for Grade 2 Reading.

Percentage Variance Accounted for
Grade 2 Reading

	Multiple Regressions			Stepwise Regression Variables	
	All Variables	Single Variables	%		%
Residual Scores	0	WD-1(-)	15	N = 3*	46
		WD-4(-)	16	R-3	
		R-3	17	R-2(-)	
		AP-12	10	WD-1(-)	
Mean Difference Scores	0	R-3	13	N = 8*	59
		WD-1(-)	12	R-3	
				AP-1	
				WD-5	
				R-2(-)	
				WD-1(-)	
				AP-12(-)	

The teaching performance variables as a group produce nonsignificant results. Four variables taken one at a time each accounts for ten to 17 percent of the variance. The most substantial results appear in the stepwise regressions for both residual scores and mean difference scores. The use of a variety of materials (R-3

*Only predictors with significant regression weights are listed

and WD-5) appears as a positive predictor. Multiple goals in each lesson (R-2) and WD-1 (time spent teaching) are negative predictors.

Mathematics - Grade 2

The percentage of variance accounted for by the significant predictors for Grade 2 Mathematics are presented below:

Percentage Variance Accounted for
Grade 2 Mathematics

	Multiple Regressions			Stepwise Regressions	
	All Variables	Single Variables	%	Variables	%
				N = 6	45
Residual Scores	0	WD-4(-)	18	AP-11	
		AP-7(-)	7	WD-2	
				WD-4(-)	
				AP-7(-)	
Mean Difference Scores	0	WD-4(-)	12	N = 5	34
				WD-2	
				WD-4(-)	
				AP-9(-)	
				AP-2(-)	

Again the most substantial results appear in the stepwise regressions. In both cases a relatively few variables are accounting for a third to almost half of the variance in the two kinds of scores.

The following table presents the summary for Grade 5 Reading and Mathematics. (See below.)

Percentage Variance Accounted for
Grade 5 Reading

	Multiple Regressions			Stepwise Regressions	
	All Variables	Single Variables	%	Variables	%
Residual Scores	0			N = 6*	35
		WD-1(-)	1	R-4	
		R-3(-)	6	AP-2(-)	
		AP-8(-)	8	AP-8(-)	
				WD-1(-)	
				AP-1(-)	
				N = 2	15
Mean Difference Scores	0	AP-2(-)	9	AP-2(-)	
		AP-8(-)	8	AP-8(-)	

Grade 5 Mathematics

	Multiple Regressions			Stepwise Regressions	
	All Variables	Single Variables	%	Variables	%
				N = 7*	49
Residual Scores	(Approaches Significance) $p = .12$	WD-4	15	WD-4	
				AP-10	
				AP-13	
				WD-1(-)	
				AP-2(-)	
				R-3(-)	
				N = 7*	42
Mean Difference Scores	0	WD-4	11	WD-4	
		AP-2(-)	8	AP-6	
		AP-5(-)	7	AP-13	

*Only predictors with significant regression weights are listed.

The stepwise regressions again produce the most substantial results, with the exception of those for mean difference scores in reading.

Of the six stepwise regressions, five produced R^2's from .35 to .59. This is a substantial amount of variance to account for with relatively few predictors. The results with mean difference scores are important to note because the difference scores are less reliable. A number of predictors are negative which tells us what performances are likely to be associated with lower scores. Generally, in previous research investigators have looked for positive predictors. This research has produced both kinds of predictors.

Some readers may be disappointed when only one positive predictor appears in a stepwise regression, as at second-grade reading. But as we have pointed out, a variable like R-3 (variety of materials) is correlated with other variables. An examination of these correlates usually fills out the picture of a pattern of performances which probably is effective. In the case of some negative predictors, however, it is likely that these variables by themselves are interfering with or inhibiting learning. AP-8 (organizing for instruction), for example, is a performance that takes away from instructional time. AP-2 (inattentiveness) also probably has a direct effect on learning.

Another way to look at the results of these analyses is to count how frequently a variable appears significant across all analyses. This way of summarizing the results is interesting, but

the reader is reminded that the reason for performing the various kinds of regression analyses was to find the combination of variables that account for the greatest amount of variance. The following description of the frequency counts of significance should be read with this point in mind. It really tells us less than the stepwise regressions, but it does give a "feel" for the power of certain variables as predictors.

We recognize that we are combining predictors which are predicting different kinds of scores, but, as is apparent in Tables 7.29 and 7.30, a frequently occurring variable has often been significant in predicting both residual and mean difference scores.

Tables 7.29 (Grade 2) and 7.30 (Grade 5) list the variables which appeared significant in each analysis by subject. The "+" and "-" signs indicate the sign of the regression weight.

Reading - Grade 2

Frequency of Variables Significant and Positive

f	1	2	3	4
	WD-5 AP-1 AP-12			R-3

Frequency of Variables Significant and Negative

f	1	2	3	4
	WD-4 AP-12	R-2		WD-1

Above is the listing of the frequency counts for second-grade reading. R-3, for example, is positive four times in all of the

Table 7.29

Summary of Significant Grade 2 Teacher Performance Variables Listed by Type of Analysis
(Discriminant Group: $N_R = 33$; $N_M = 37$)

	Multiple Regression				Stepwise Regression	
	A.		B.		C.	
	All Variables		Single Variables			
	Residual Scores	Mean Diff.	Residual Scores	Mean Diff.	Residual Scores	Mean Diff.
Reading	n.s.*	n.s.	R-3 (+) AP-12(+) WD-1 (-) WD-4 (-)	R-3 (+) WD-1 (-)	R-3 (+) WD-1 (-) R-2 (-)	WD-5 (+) R-3 (+) AP-1 (+) WD-1 (-) R-2 (-) AP-12(-)
Mathematics	n.s	n.s.	WD-4 (-) AP-7 (-)	WD-4 (-)	WD-2 (+) AP-11(+) WD-4 (-) AP-7 (-)	WD-2 (+) WD-4 (-) AP-2 (-) AP-9 (-)

*non-significant

Table 7.30

Summary of Significant Grade 5 Teacher Performance Variables Listed by Type of Analysis
(Discriminant Group: $N_R = 41$; $N_M = 45$)

	Multiple Regression				Stepwise Regression	
	A.		B.		C.	
	All Variables		Single Variables			
	Residual Scores	Mean Diff.	Residual Scores	Mean Diff.	Residual Scores	Mean Diff.
Reading	n.s.*	n.s.	WD-1 (-) R-3 (-) AP-8 (-)	AP-2 (-) AP-8 (-)	R-4 (+) WD-1 (-) R-3 (-) AP-1 (-) AP-2 (-)	AP-2 (-) AP-8 (-)
Mathematics	n.s.	n.s.	WD-4 (+)	WD-4 (+) AP-2 (-) AP-5 (-)	WD-4 (+) AP-10(+) AP-13(+) WD-1 (-) R-3 (-) AP-2 (-)	WD-4 (+) AP-6 (+) AP-13(+) WD-1 (-) AP-1 (-) AP-2 (-)

analyses in which we found significant relations (recall that regressing scores against all performance variables never produced a significant R). R-3 (use of a variety of materials) is obviously the best predictor for Grade 2 Reading. Note that WD-5, also variety of materials, predicts significantly.

If we also consider AP-12 and AP-1, we have a picture of a teacher who, if he or she has high scores on all of these variables, uses a variety of materials (R-3 and WD-5) and uses a variety of interactive teaching responses individually with pupils (AP-12), mainly instructing and positive feedback, and whose pupils are productive during reading (AP-1).

The most frequent negative predictor is WD-1 (time spent teaching); then R-2 (a variety of instructional goals weighted with the time pupils spent acquiring and practicing skills). Using also WD-4 (variety of instructional contexts), we see a picture of a second-grade teacher with an array of high scores on these variables who is organizing instruction in a variety of ways (WD-4) and is also trying to achieve a variety of goals (R-2). The negative predictors also include AP-12 (responsiveness to individual pupils) which emerged in the stepwise regression. Its negative score may be the result of the plane-fitting process, or there may be a combination of AP-12 with other variables which together constitute an ineffective system.

WD-1 (time spent teaching) is a consistent negative predictor, Time spent teaching in the absence of quality of instruction does

not help. Further, some of the performances exhibited by teachers who have high scores may interfere with learning. A teacher, for example, who places the children in independent work (AP-5), and who uses a variety of materials (WD-5), may be providing relatively less effective teaching to pupils. Therefore, spending more time (WD-1) probably means spending more time in an ineffective instructional situation. Thus, WD-1 may be a proxy for such ineffective teaching.

Another way to look at these results is to study the correlations of a variable like R-3 (variety of materials) with other variables. Positive and substantial correlations indicate that teachers whose performances were classified as R-3 would also be likely to be seen doing other things classified as R-3's correlates. R-3 has the following correlations with other performances where r is equal to or larger than .20:

R-3 with:
- R-2 (variety of goals), r = .52
- R-4 (pupil seatwork), r = .60
- AP-3 (attentive pupil behavior), r = .25
- AP-9 (monitoring pupil progress), r = .20
- AP-12(responsiveness to pupils), r = .35

Visualize a teacher who has high scores on all these performance variables. The teacher provides a variety of instructional activities related to different purposes such as practicing and reviewing (R-2). These activities are conducted mainly through supervised independent seatwork (R-4). Pupil on-task behavior is high (AP-3). The teacher monitors pupil progress (AP-9), providing positive reinforcement, praise and brief instruction (AP-12). These are the teaching

performances of direct individual instruction. The teacher has arranged a set of conditions in which he or she teaches each pupil frequently.

A comment on this method of making interpretations is appropriate. We are not claiming that all of these variables are positive and significant predictors. Only R-3 was. What the regression analyses show is that R-3 accounts for some of the variance in scores, and that adding these other variables would add nothing to the prediction or the fit of the regression line.

But what we are proposing here is that a teacher who has high scores on R-3 is also likely to be a teacher with high scores on these other variables. Then we ask what a teacher would look like who had high scores on all the variables that are correlated with R-3.

This way of looking at the data makes sense because of the amount of intercorrelation among the variables. There are teachers who will have high scores on one or more of the correlates of R-3. There will also be other patterns. This variability in the patterns is such that in the regression analyses we do not find all of these correlates to be significant predictors.

The interesting feature of the pattern of the correlates of R-3 is that it is a picture of teaching that makes psychological sense. It is a direct individual instruction model. If we had two sets of teachers sharply differentiated in terms of this pattern, we might find significant differences in the scores of their pupils.

Thus we see that R-3 is a significant predictor to use in order to hypothesize which pattern of teaching performances might be most effective.

The second way to look at the data is to organize it by counting the number of times a variable was a significant predictor across all analyses.

Grade 2 - Mathematics

Frequency of Variables Significant and Positive

f	1	2	3	4
	AP-11	WD-2		

Frequency of Variables Significant and Negative

f	1	2	3	4
	AP-2	AP-7		WD-4
	AP-9			

Above are the frequencies of occurrence of the significant variables in the analyses in mathematics for Grade 2. There are three positive predictors across all analyses. WD-2, range of content covered, predicts positively twice. AP-11, teacher mobility, predicts once. AP-11 is probably a proxy for other variables; AP-11 and WD-1 (time spent teaching) have an $r = .55$ and AP-11 and R-4 (supervised pupil seatwork) have an $r = .36$. If we are willing to assume that AP-11 is a proxy for these other variables, then we have a picture of a teacher having high scores on AP-11 who moves around the class while the pupils are working independently.

AP-11 may also be a proxy for WD-1 (time spent teaching). Thus the combination of WD-2 (range of content) and WD-1 represented by AP-11 is increased instructional "input"; hence, there is a greater probability of the pupils learning more.

Reading - Grade 5

Frequency of Variables Significant and Positive

f	1	2	3	4
	R-4			

Frequency of Variables Significant and Negative

f	1	2	3	4
	AP-1	WD-1	AP-2	
		R-3	AP-8	

Above is the frequency of occurrence of the significant variables for reading at the fifth grade. The only positive predictor is R-4 (variety of instructional activity weighted with independent seatwork). R-4 has substantial correlation with R-1, r = .56; R-2, r = .53; R-3, r = .59. Thus a teacher who has higher R-4 scores is probably spending more time teaching reading (R-1), has a variety of instructional goals (R-2) and uses a greater variety of materials (R-3).

The negative predictors appearing three times are AP-2 (pupil inattentiveness) and AP-8 (organizing instruction). Occurring twice are WD-1 (time spent teaching) and R-3 (variety of materials). R-3 we know correlates substantially with R-4, so its negative sign may be a result of the plane-fitting process. Other interpretations are that a variety of materials may produce a lack of structure; or the materials

may be inappropriate to the order of instruction; or the teachers have difficulty managing the instructional process when a variety of materials is used.

The negative predictor with the greatest frequency is WD-4 (variety of instructional contexts). AP-7 (teacher-directed classwork) is the second most frequently appearing variable. Thus the two negative predictors are teaching the class-as-a-whole, or varying instructional contexts which includes teaching groups or teaching the class-as-a-whole. These performances are the opposite of what appears among the positive predictors.

Mathematics - Grade 5

Frequency of Variables Significant and Positive

f	1	2	3	4
	AP-6	AP-13		WD-4
	AP-10			

Frequency of Variables Significant and Negative

f	1	2	3	4
	R-3	WD-1	AP-2	
	AP-1			
	AP-5			

Above are listed the frequency of occurrence of the significant variables in the analyses for Grade 5 mathematics. Among the positive predictors most frequently occurring are WD-4 (variety of instructional contexts) and AP-13 (social control). WD-4 has substantial positive correlations with WD-1 (time spent teaching), $r = .38$; WD-2 (range

of content), r = .67; WD-5 (variety of materials), r = .76; R-1 (time spent teaching), r = .46. Thus, the teacher with high scores does considerable instructing, spends more time teaching mathematics, uses more materials, and covers more content. AP-6 (teacher-led instructional groups) and AP-10 (developing pupil understanding) also are positive predictors of Grade 5 mathematics.

Among the frequent negative predictors are pupil inattentive behaviors (AP-2). Thus AP-13 (social control) is a positive predictor and AP-2 is a negative predictor. WD-1 (teaching time) probably has a negative sign as a result of the plane-fitting process because of its substantial correlation with WD-4 which is a positive predictor. R-3 (variety of materials) is probably negative because its r with total spring score is -.01. AP-5 is independent pupil seatwork; AP-5 and AP-2 (inattentive behaviors) correlate positively, r = .57. Thus inattentiveness can be predicted from the use of independent seatwork. AP-1 (pupil productivity) correlates insignificantly with spring scores (r = .05) and is probably appearing as a negative predictor as a result of the fitting process.

We suspend the interpretation of these data here. What we have been trying to do is to see if the results make sense. Making sense means that positive predictors are variables that we would expect to make a positive difference in learning, and negative predictors to be related to less learning.

Our strategy was to provide an overview in which the most frequently occurring significant variables were used as indicators of the major features of a style likely to be associated with higher or lower scores. Frequently these variables were positively correlated with other variables so that we could put together what a pattern of high or low scores would represent in teaching behavior.

Then we looked at less frequently occurring variables which typically appeared in the stepwise regressions. We used these variables to fill out our picture.

These interpretations should be taken as interpretations; as an attempt to give meaning to the results. These interpretations are hypotheses about more effective and less effective teaching.

In studying the results presented in this chapter, the reader should recall the nature of the teaching performance measures. Each category of performance is a collection of "smaller" performances. These measures should be thought of as consistently recurring events. As such they describe the major ways in which teachers may differ. A relevant way of understanding the results is to answer the question, which of these major events is significantly related to pupil learning?

The results to this point indicate categories which have appeared as significant positive or negative predictors. In second-grade reading R-3 (variety of materials) was a significant positive predictor

in four analyses. It does not follow, however, that one should conclude that simply using a variety of materials will improve learning. It is important to know what other performances are likely to be associated with using a variety of materials. It is probably this complex of events that affects learning rather than any one performance in it.

There is another way to look at these results. Recall that in grouping the original performance variables we collected events so that variations with respect to the dimensions of a model of direct individual instruction might be detected. Thus, we used three instructional-context categories, independent pupil work, teaching a group, and teaching the class-as-a-whole.

We wanted to know if departure from this model along the context dimension made a difference in pupil learning. We have seen that AP-7, teaching the class-as-a-whole, is a negative predictor in second-grade mathematics. Similarly WD-4 (variety of instructional contexts) was a negative predictor in all regression analyses of achievement scores on teaching performances in second-grade mathematics. The consistency in these two results strongly suggests that departure from the model in teaching second-grade mathematics is associated with differences in learning. Also the fact that R-3 (variety of materials) is also correlated with other components of direct individual instruction indicates that the model is an effective way of teaching second-grade reading. We offer as a preliminary hypothesis that the degree to which teaching

performances include the components of a model of direct individual instruction, teaching in second-grade reading and mathematics is more likely to be effective.

But there are also suggestions in the results that this model has different components at the two grades. Variety of materials (R-3) appears as a negative predictor in fifth-grade mathematics and reading. But WD-4 appears as a positive predictor in fifth-grade mathematics. The first of these results suggests that a variety of materials is less effective in teaching reading and mathematics at the fifth grade. We do not know why this is so. Perhaps in teaching reading the use of a variety of materials is difficult to organize. At the fifth grade the pupils' skills may be more diverse, so more diverse materials are required to accommodate these differences. That using this range of materials leads to more organizing is apparent in its correlation with AP-8 (organizing); $r = .45$. AP-8 is also a negative predictor for fifth-grade reading.

In mathematics the problem may be the same; however, for R-3 and AP-8, $r = .07$. But another possibility is that using a diversity of materials interferes with the structure of the learning tasks which in mathematics are usually sequential. We do not know if this possibility is a valid explanation. But this departure from the model of direct individual instruction (which includes a component of adapting the materials of instruction to the child) bears attention.

Teacher activities and responses, which have been the objects of the study in previous research, appear infrequently as predictors in these analyses. But it should be remembered that they are usually correlates of the significant predictors. To us this suggests that it is patterns of context, use of materials and teaching activities and responses that are the critical variables rather than single performances.

We have seen in this chapter that the teaching performance variables account for a substantial portion of the variance in both kinds of scores, residual and mean difference scores. The reader was warned, however, that when we performed these analyses we knew that the regression lines by class were not parallel. In the next chapter we analyze the differences in these slopes in relation to teaching performances.

BEGINNING TEACHER EVALUATION STUDY: PHASE II

FINAL REPORT: VOLUME I, CHAPTER 8

THE ANALYSIS OF DIFFERENCES IN STUDENTS' PERFORMANCE BY CLASSES AND THE RELATION OF TEACHING PERFORMANCES TO THESE DIFFERENCES

INTRODUCTION

In the previous chapter and at several other points we have pointed out that when we regressed achievement scores on teaching performances by class, we found that the slopes of the regression lines were not parallel. We therefore devised a way to sort the classes by these slopes. After which we regressed these differences by slope against teaching performances.

The first section of this chapter analyzes the concept of teaching effectiveness in terms of a regression model. In such an analysis the teaching performances of teachers who are outliers with positive and significant residuals are contrasted with those of other teachers. Had the slopes of the individual regression lines been parallel, we would have used this way of estimating different teacher effects.

The second section describes the analysis of the regressions by class. Considerable information is given on the ways in which the classes differ when they are sorted by the differences in slopes. The third section presents the data on the relation of socioeconomic status of the pupils to achievement measures to strengthen the argument that the differences among the classes is not explained solely by socioeconomic differences among them.

The fourth section of the chapter presents the results of the multiple and stepwise regressions of achievement scores on teaching performances. In these analyses we found that teaching performances account for almost all the variance in slopes. Further, the patterns

of positive and negative predictors suggest different patterns of teaching performances so that it is a reasonable inference that these patterns account for the different pupil effects.

The Concept of Effective Teaching Performances

The problem of defining teaching effectiveness is one of distinguishing among teachers in terms of the differences in their students' achievement and growth in students' attitudes. An obvious way of making useful distinctions is to consider the differences in achievement of groups of children who have different teachers. If a group of children taught by a teacher performs at a second testing only as well as or less well than as at the first testing, one plausible explanation is that the teacher is less effective than teachers whose pupils made positive gains.

A competing explanation, however, is that, although the teacher was acting in a way that would ordinarily be expected to influence learning positively, the children had learned so little previously or the stimulus to learning provided by other sources such as the home was so weak, the effects of teaching performances were ameliorated or inhibited. Thus, to account for the effects of teaching performances all other influences on learning must also be accounted for at the same time. The structural model tested in this study is the method that has been used for partialling out the relative effects of other variables influencing or related to learning.

But assuming that the influence of factors other than teaching performances has been measured, how is the effectiveness of teaching performances to be judged? There are two steps in this process. The first step is to identify teachers whose pupils have made greater than expected gains. The second step is to identify the teaching performances which distinguish these teachers from the other teachers. The concept of greater than expected gain will be explained in the following section. But the reader should consider the following facts as background for reading that section.

Other things being equal, the correlation between two measurements of achievement should be highly correlated. The correlation is higher when the two measurements are closer in time. The meaning of this correlation is that what the pupil knows as measured at the first testing is the best predictor of his or her subsequent performance. The second testing measures what has been "added" to the learning reflected in the first measurement.

In this study the correlations for all children between the fall and spring measures of reading skill run about .90. Thus, about 80 percent of the variance in the spring scores is "accounted for" by the variation in the fall scores. It is against the background of this fact that the question is asked, do some children learn more than others relative to the general relation represented in a correlation coefficient of .90?

If we used the children's fall scores in a regression equation of the form, $Y' = bX + a$, to predict spring scores, do we find children or groups of children whose actual scores significantly exceed their predicted scores? Children whose actual spring scores significantly exceed their predicted spring scores have made greater than expected gains. This concept underlies the methodology used in this study to describe differences in teaching effectiveness.

The logic of the analysis is that when the gains are greater than predicted, some intervention has occurred which "explains" this relative departure from what would be expected. The analytic problem to be solved is to determine first how much of these differences may be attributed to teaching performances and then to determine which teaching performances may be accounting for the differences. Thus an effective teaching performance is one which accounts for a significant proportion of the variance in final (spring) scores when the effects of other sources of variation in these scores such as initial (fall) scores have been partialled out of the statistical relation between the teaching performance and final scores.

There are several different ways in which this concept may be applied. We may look for differences of the kind described in groups of children -- the classes taught by each teacher. Or, we can look within classes to find different kinds of children who may have made greater than expected gains to identify teachers who are more effective with certain kinds of children. Or we may analyze teaching performances in terms of different measures of learning.

Given these possibilities and the definition of an effective teaching performance, it is obvious that there are many different meanings of effective teaching. We would need independent criteria derived from a conception of values about what is to be learned to state that one of these is better than another. We may find that some teaching performances are relevant to some criteria but not to others, or we may find that some teaching performances are effective when many, most, or all criteria are considered.

There are two other possible meanings of effectiveness which were not used in this study. One could define the effective teacher as the teacher who brings all students to a minimum level of competence and the effective performances are those associated with meeting this criterion. Another concept of teaching effectiveness is one that stipulates that some of the expected pupil outcomes are more important than others, and therefore, the performances most associated with these criteria are the indicators of effectiveness. Since there is no way of establishing such criteria for this study, these meanings of effectiveness are not used.

Using the Magnitude of Residuals from the Regression Line

Assume for the purposes of illustration that we use a single score such as a total reading score or a reading comprehension score or a decoding skills score as the criterion variable. Also assume that we have given a test or equivalent forms of a test to measure achievement at two points in time. (In this study such tests were given in the fall and in the spring.) So for each student on each

such test there are two scores, a fall score and a spring score. If the spring scores are regressed on fall scores, a set of constants may be derived from these scores which are the constants in the regression equation, $Y' = bX + a$.

If this equation is plotted, a figure like Figure 8.0 is the result. The line in that figure is a regression line, the constant b in the equation is the slope of that line and a is the intercept on the Y-axis. The points clustered around this line represent student scores.

If a similar statistical analysis is made but the means for each teacher's class are plotted (instead of the individual scores of students) a similar figure results. In Figure 8.0 each point represents a class. The abcissa of each point is the class's mean score in the fall; the coordinate is the class's mean score in the spring. All of the classes will be clustered around this line, some points close to the line, others at varying distances above and below the line.

The distance from any point to the regression line is called a residual. This residual has a numerical value represented by the distance from the point to the line. The residuals of points above the line are usually given a plus sign, those below the line a minus sign. In Figure 8.0 A, C, D, and F have positive residuals; B, E, and G have negative residuals.

Consider Y'_c. The coordinates of this point are derived directly from two pieces of information. One, the X-value directly

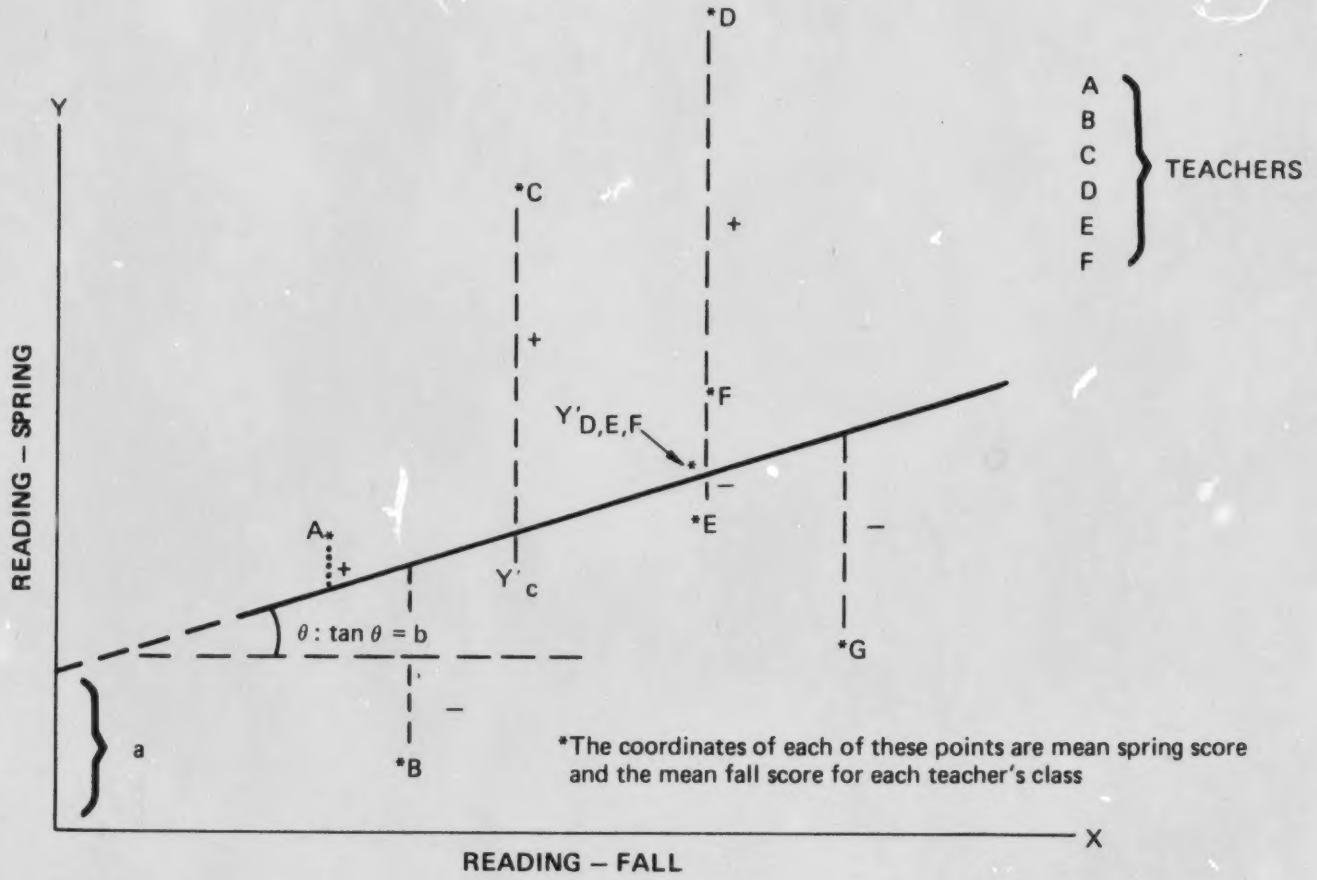

Figure 8.0. Magnitude of Residuals From the Regression Line as a Measure of Teaching Effectiveness

below Y'_c which represents the mean reading score in the fall. The Y'-value, the other coordinate, is derived by substituting this X-value into the regression equation given above. Note that the actual mean Y-value for C's class is considerably above Y'_c. The difference between these two values is positive, and as the figure suggests, substantial.

Of what significance are the departures of the mean Y'-values from the line? The Y'-values, the points along the line directly above any given X-value, represent the best prediction of the mean value of the spring reading score given the mean value of the fall reading score. The concept being employed for analysis here may be stated as follows: if the spring and fall scores were perfectly correlated, and the results plotted as a regression line, all points representing the mean values of each class would fall along the line. If some points do not, and if their departure from the line is significant, then factors other than those related to the initial performance of students are affecting the final performance of students.

The phrase, "factors other than those associated with the initial performance of the students," is the key to the analysis to be performed. In other words, by performing the regression analysis we know that the variance in spring reading scores is accounted for in part by the fall scores. Assume, for example, that the correlation between spring scores and fall scores is .50; then we would know that 25 percent of the variance in spring scores is attributable to the variance in fall scores.

A number of factors may account for departures from the regression line. The socioeconomic status of the students and students' aptitudes are two factors that come immediately to mind. If the variance attributable to these factors is partialled out, the remaining portion of the variance is that which is attributable to teacher performance. In this study the structural analysis provides us information on the amount of the variance in student scores which is attributable to such factors. With this information, we can then look at the teaching performances of these teachers to determine if the teachers with the largest and most significant positive residuals are distinguished from other teachers in terms of their teaching performances.

The definition of teaching effectiveness implied in this analysis is: the most effective teachers are those whose classes show the largest and most significant positive residuals in a regression analysis using scores for children's learning or growth obtained at two points in time, and when the amount of variance in final scores has been accounted for in terms of all of the factors which may influence final performance. Refer to Figure 8.0 again. Applying the definition just given to the information in that figure would lead to the conclusion that teachers C and D are the most effective teachers in this particular group. (We are assuming that we have accounted for other sources of variance in the final scores.)

Given this concept of teaching effectiveness, hypotheses about effective teaching performances are generated in the following

manner. First, an analysis of the kind described is performed. Second, those teachers whose class scores yield positive and significant residuals are identified. Other sources of variation in final scores are accounted for and partialled out. The teaching performances of the teachers whose classes have large and significant positive residuals are contrasted with the teaching performances of other teachers.

The reader should be warned, if he or she is not already aware, that deriving hypotheses about teaching performances by using this method of induction has a weakness. In repeated analyses with the same teachers, the teachers identified as the "most effective" in the first analysis may not turn up as the most effective teachers in a second or third analysis. The same analysis performed with a different sample of teachers may not yield the same distinguishing characteristics. The only solution to these problems is to repeat the study with the same or different teachers, winnowing out of each analysis those teaching performances which repeatedly show up as associated with the most effective teachers as defined by this method. Since this phase of the Beginning Teacher Evaluation Study is a hypothesis-generating phase, the teaching performances identified by the methods described here must be regarded only as hypotheses whose validity needs to be tested by factorial experiments or by replications of this study. These hypotheses serve as guides for what to look for in succeeding studies and as one set of facts that need to be taken into account in a fuller analysis of effective teaching performances.

An Alternative Analysis

There is another way of sorting out the teachers' classes which is important to use if the regression lines for individual classes depart markedly from the regression line for the group of teachers' classes. In the analysis we have been describing, the assumption is made that if we looked at individual classes, that is, performed a regression analysis by class, the resulting regression lines would be parallel to the regression line in the overall analysis. This assumption may not be valid, but it is easily tested. All one has to do is perform a regression analysis for each class which will yield as many regression analyses as there are teachers.

The routine used for regression analysis first produced regressions by class. When we inspected these regressions it was obvious that the regression lines were not parallel. We devised a way to portray these differences simply. When we inspected this organization of the data, it was also obvious that not only were the regression lines not parallel but also that the differences in slopes was substantial.

At this point we studied the other differences in the classes when organized by the magnitudes of their slopes. A description of the original analysis of the differences among classes by slopes and other differences associated with them is the next section of this chapter.

Differences in Pupil Achievement Among Classes

To determine if differences in pupil achievement occurred among classes, individual regression analyses were performed by teacher. These analyses were performed because a regression analysis of the total group of pupils without this additional information might mask significant and meaningful differences among the teachers. The computational routine, however, also gives the results of the regression analysis for the total group.

The unit of analysis for these regressions was the scores of the students taught by each teacher. In all cases the number of degrees of freedom indicated in Table 8.1 for a teacher in either reading or mathematics indicates the number of students that were taught by that teacher in that subject. Refer to Table 8.1; Teacher 05, for example, taught 19 students reading and 18 students mathematics, but these were not necessarily the same students.[2] In some cases they were; in other cases the two groups were different depending upon the organization of instruction in the schools. In schools where teachers taught a single class most or all of the curriculum, the number of students represents the same students. Thus, if Teacher 05

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[2] All data were stored by individual students and teachers. Various collections were made for the analyses reported in the following pages. The reader should, therefore, be alert to the variations in the "class sizes." Such differences occur either because a different collection of students is required for a specific analysis or because data are missing on an individual student. Also when the size of a group linked to a particular teacher was less than 10, the scores of these students were not used. Note, for example, in Table 8.1 that no data are reported in reading for Teacher 10, 12, 33, 34, 49, and 84. Data for reading are not reported for these teachers' students because the number of students taught by that teacher for whom there were scores was less than 10. Classes in some schools were reorganized after the fall testing, even as late as January. The analyses used the scores only of the students taught by the teacher for the entire year. All analyses include only those teachers and students for whom complete data were obtained on the measures used in that analysis.

Table 8.1

Results of the Regression of Spring Total Scores on Fall Total Scores: Correlation Coefficient (r), Slope (b), Intercept (c), Standard Error of Correlation ($\sigma^2_{y.x}$) Coefficient and the Probability of the F-Value for the Regression for Each Group and Total Group in Reading and in Mathematics; Grade 2 ($N_{T_R} = 33$; $N_{T_M} = 38$)[1]

	TOTAL READING						TOTAL MATHEMATICS					
T#	r	b	c	df[1]	$\sigma^2_{y.x}$	p	r	b	c	df[1]	$\sigma^2_{y.x}$	p
03	.87	.98	17.45	13	29.62	.0001	.89	1.02	28.49	16	18.58	.0000
04	.91	1.12	- 5.99	11	31.05	.0001	.85	.98	58.03	12	22.40	.0005
05	.83	.86	42.02	19	32.64	.0000	.85	.86	52.54	18	23.16	.0000
07	.93	1.00	7.99	18	23.95	.0000	.82	.82	60.05	23	23.06	.0000
08	.75	.91	14.82	22	32.35	.0000	---	---	---	--	---	---
09	.47	.66	51.37	22	36.92	.03	---	---	---	--	---	---
10	---	---	---	--	---	---	.90	.90	50.25	21	14.52	.0000
11	.63	1.21	-31.63	10	36.91	.05	.56	.56	89.16	23	21.17	.0050
12	---	---	---	--	---	---	.73	.87	58.22	23	21.69	.0001
18	.65	.80	62.55	19	45.28	.0025	.80	.92	38.12	19	19.51	.0000
21	.74	.89	16.72	13	29.49	.0040	.82	1.44	-44.57	17	22.52	.0001
22	.84	.70	80.50	18	20.65	.0000	.87	1.13	10.70	25	18.46	.0000
24	.73	.89	24.72	27	27.73	.0000	.62	.81	54.38	27	14.81	.0006
29	.84	1.00	26.0[illegible]	18	30.40	.0000	.85	.99	20.40	18	23.65	.0000
31	.84	.78	67.64	23	30.11	.0000	.76	.72	74.29	24	17.39	.0000
33	---	---	---	--	---	---	.81	.96	21.45	14	19.14	.0004
34	---	---	---	--	---	---	.92	1.02	20.83	16	13.57	.0000
35	.71	.90	52.35	10	36.90	.0204	.59	.58	82.99	20	20.17	.0057
40	.63	.69	69.19	17	36.86	.0070	.80	1.27	-21.71	20	18.11	.0000
42	.84	1.20	-14.70	17	37.97	.0000	.73	.83	50.00	17	27.79	.0008
45	.82	.74	72.97	21	26.06	.0000	.76	.87	50.73	22	16.43	.0000
47	.80	.77	77.06	26	29.64	.0000	.52	.64	93.55	27	27.17	.0057
49	---	---	---	--	---	---	.78	.69	58.97	25	13.92	.0006

Table 8.1 (continued)

	TOTAL READING						TOTAL MATHEMATICS					
T#	r	b	c	df	$\sigma^2_{y \cdot x}$	p	r	b	c	df	$\sigma^2_{y \cdot x}$	p
50	.76	1.03	-16.15	11	34.17	.0062	.64	1.35	-50.51	15	29.00	.0104
53	.80	1.11	2.46	18	37.42	.0001	.91	.92	30.23	18	18.12	.0000
54	.73	.93	24.90	22	42.73	.0001	.67	.57	81.18	25	18.18	.0002
58	.70	.80	42.47	16	44.34	.0024	.78	.78	61.05	19	22.62	.0001
71	.56	.93	23.17	19	36.24	.01	.78	1.05	13.61	20	20.68	.0001
72	.87	1.16	-27.54	21	28.85	.0000	.80	.87	33.67	21	20.12	.0000
73	.72	.80	53.72	20	44.00	.0004	.76	.98	17.16	20	21.55	.0001
76	.79	.91	33.72	18	32.45	.0001	.79	.68	67.25	18	13.33	.0001
77	.82	1.10	1.35	18	28.01	.0000	.75	.73	69.11	18	19.23	.0003
79	.77	.90	31.32	22	29.41	.0000	.73	.67	74.17	21	15.98	.0002
83	.63	.71	40.82	20	35.56	.0028	.06	.06	163.87	21	23.59	.84
84	---	---	---	--	---	---	.86	1.02	9.74	17	21.84	.0000
86	.61	.60	79.25	16	35.89	.0126	.61	.50	99.57	16	19.84	.01
88	.90	.87	42.20	20	17.57	.0000	.64	.78	67.94	20	17.46	.0023
89	.89	1.15	-14.49	18	27.07	.0000	.87	.96	22.61	18	18.70	.0000
93	.57	.75	37.56	19	42.98	.01	.55	.49	111.53	19	18.25	.01
Total Group	.82	.90	31.75	642	34.23	.0000	.80	.85	47.90	735	21.69	.0000

[1] T indicates the number of a teacher in this analysis. df = the number of students taught by a teacher.

taught a single group of students, the number 19 for reading and 18 for mathematics represent the same individuals, the difference of one student being accounted for by missing data in mathematics for one student. If, however, Teacher 05 was in a school that utilized team teaching, then the 19 students in reading may be none or some of the 18 students in mathematics. Further, any teacher teaching a group of less than ten students was excluded from this analysis.

The total scores for reading and mathematics were used because they were the best representation of reading and mathematics achievement. In the analysis itself spring total scores were regressed against fall total scores for each group of students to whom a teacher taught reading or mathematics for the entire year. The results of these analyses are presented in Table 8.1. In that table the correlation coefficient (r), the slope (b) and the intercept (c) of the regression line are given for each class. The degrees of freedom column is the total number of degrees of freedom and represents the N of the group. The standard error of estimate and the probability (p) of the F-value of R^2, the measure of the goodness-of-fit of the regression line, are also given. The standard error of estimate is the standard deviation of the residuals about the regression line. The relative magnitude of these numbers gives an idea of the amount of spread of individual scores around the regression line.

Analysis of Grade 2: Reading

The regression analysis for the total reading score for the entire group of students is the last row in Table 8.1. Note that the correlation between spring and fall scores is $r = .82$. Note also that the slope is fairly close

to a value of 1 (.90) and the intercept is 31.75. (If fall scores were perfectly correlated with spring scores, then $b = 1$.) These data indicate that the variance in fall scores accounts for 67 percent (r^2) of the variance in the spring scores, and that the intercept is positive and substantial. Thus there is a substantial positive change in reading scores from fall to spring across all of these classes in Grade 2; the fall scores account for about two-thirds of the variance in the spring scores leaving only 33 percent of the variance in spring scores to be accounted for by factors other than the initial scores.

The regression analyses by teacher, however, present a different picture. First, it is apparent that the correlation between fall and spring scores varies from $r = .47$ (T09) to $r = .93$ (T07). A distribution of r for this sample of teachers follows:

r	f
.90 -	3
.80 - .89	12
.70 - .79	10
.60 - .69	5
.50 - .59	2
.40 - .49	1
	33

As can be seen from the distribution of frequencies, most of the r's (22) fall between .70 - .89. Three r's fall in the interval, .90 and larger, and three fall in and below the interval, $r = .50 - .59$. It is also apparent

in Table 8.1 that there is considerable variation in the slopes of the regression lines and in the magnitude of the intercepts.[3]

Note T09 where $\underline{r}$ = .47, $\underline{b}$ = .66 and $\underline{c}$ = 51.97. Contrast these values with those of T07 where $\underline{r}$ = .93, $\underline{b}$ = 1.00 and $\underline{c}$ = 7.99. This pattern of slopes less than 1 and larger intercepts contrasted with slopes equal to or greater than 1 and small positive or negative intercepts will appear regularly in the data reported in this chapter.

Table 8.2 presents these data in another form. In the upper portion of this table the frequencies of $\underline{r}$-values in each interval are indicated for intervals of the value of the intercept. As can be seen in the upper portion of that table, the values of the intercept do not appear to be related in any systematic way to the size of the correlation coefficient; for example, in the interval .80 - .89, where the largest frequency of $\underline{r}$ occurs, almost all interval values of the intercept can be found. There is one value of $\underline{r}$ with a negative intercept and in that same interval the largest value of the intercept also occurs. The smallest value of $\underline{r}$, occurring in the interval, .40 - .49, has associated with it a large positive intercept.

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[3] The reader may be puzzled by the negative values for some intercept values; for example, T04, T11, T42, T50, T72, and T89. One form of the normal equation for $\underline{c}$ is: $c = \bar{Y} - b\bar{X}$. The intercept, $\underline{c}$, will be negative if the second term in this equation, $b\bar{X}$ is larger than $\bar{Y}$. In Table 8.1 for each of the negative intercepts, the corresponding b-value is greater than 1. Thus, the X values are multiplied by a factor greater than 1 and the possibility of obtaining a negative value is increased. But a slope greater than 1 does not necessarily produce negative intercepts; see, for example, T53 where the slope is 1.11, but the intercept is positive, +2.46.

Table 8.2

Frequency Distribution of Correlations (r) by Intercept (c); Frequency Distribution of Correlations (r) by Slope (b); r, b, and c Derived from Regression Analyses by Teacher; Grade 2 Reading N = 33

c

r	-30 and over	-29 to -20	-19 to -10	-9 to 0	1-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89
.90 -				1	1				1				
.80 - .89		1	2		2	1	1		1		1	2	1
.70 - .79			1			2	2	2	1	2			
.60 - .69	1								1		2	1	
.50 - .59							1	1					
.40 - .49										1			
N	1	1	3	1	3	3	4	3	4	3	3	3	1

b

r	.60-.79	.80-.99	1.00-1.19	1.20-1.39
.90 -		1	2	
.80 - .89	4	2	5	1
.70 - .79		9	1	
.60 - .69	3	1		1
.50 - .59	1	1		
.40 - .49	1			
N	9	14	8	2

In the lower portion of the table, the values of $\underline{r}$ are plotted against values of the slope. Again a marked relationship between $\underline{r}$ and $\underline{b}$ in this sample of teachers is not apparent; the Pearson $\underline{r}$ is .49, and the Spearman rank-order $\underline{r}$ is .47. Consider the column with the largest frequency for values of $\underline{b}$, the interval, .80 - .99. The corresponding values of $\underline{r}$ are spread across all of the intervals of $\underline{r}$ except the lowest. An absence of relationship in this case should not be surprising since $b = r \frac{\sigma_y}{\sigma_x}$; obviously there would be a linear relationship between $\underline{b}$ and $\underline{r}$ only if the values of $\frac{\sigma_y}{\sigma_x}$ were constant or similar in value across all classes.

The most obvious conclusion to be drawn from the data presented above is that there is substantial variability among classes with regard to both slopes and intercepts of regression lines. The meaning of the variability in the slopes is that changes are occurring at differential rates on different parts of the score intervals. A steeply sloped line, that is one for which the value of $\underline{b} < 1$, indicates that changes were made by pupils in all initial score intervals. The differences in the amounts of change between those at the higher and lower initial score levels is not as great in this case.

The intercept is not interpreted quite as easily. The intercept is a function of the difference between the mean of the spring scores, the mean of the fall scores, and the slope of the regression line: $c = \frac{\Sigma Y}{n} - b \frac{\Sigma X}{n}$ or $c = \bar{Y} - b\bar{X}$. But $\underline{b} = r \frac{\sigma_y}{\sigma_x}$; therefore, $c = \bar{Y} - r \frac{\sigma_y}{\sigma_x} X$. The intercept will vary as a function of the two means, the correlation between the spring and fall scores, and the variance of the scores in the spring and fall.

Suppose that two classes had the same mean both in the fall and in the spring. The correlations for each group between the fall and spring scores may be the same or different, and the variances of each group in the spring and fall may differ in several ways. Assume that the spring mean $\bar{X}_f = 10$, and the fall mean, $\bar{X}_s = 5$. The mean gain for both classes is the same: $\bar{X}_s - \bar{X}_f = 5$.

But the pupils in each group may differ in the amount of their individual gains, a difference which would be reflected in their respective correlation coefficients. The spring scores of one class might be spread out more or less than the scores of the other class. To see how the intercept fluctuates as a function of such differences consider the following table:

		r								
		.60		.70		.80		.90		
		b	c	b	c	b	c	b	c	
$\frac{\sigma_y}{\sigma_x}$	.5	.30	8.5	.35	8.25	.40	8.0	.45	7.75	$\bar{X}_f = 5$
	1.0	.60	7.0	.70	6.50	.80	6.0	.90	5.50	$\bar{X}_s = 10$
	1.5	.90	5.5	1.05	4.75	1.20	4.0	1.35	3.25	

Variations by r are across columns, and variation by $\frac{\sigma_y}{\sigma_x}$ are in rows. c varies as a function of the correlation r and the ratio of the variances; the corresponding values of b are provided. The following statements summarize the pattern of relations:

1. If two groups have the same mean gain from fall to spring, and if their variances are in the same ratio in the spring and fall, the intercept decreases as the correlation between fall and spring scores increases. If the ordering of the pupils by score is considerably different in the spring than in the fall, the intercept will be larger.

2. If the rank order of the pupils in the two groups is the same (read down any column), but the pupils' scores in one group are more spread out in the spring than in the fall, the intercept of this group will be smaller.
3. The correlations and the ratio of the variances may be different in the two groups. Compare the numbers in the upper left-hand corner with those in the lower right-hand corner; the upper left-hand corner is a class where the rank order of the pupils has changed ($\underline{r}$ = .60) but the scores are less spread out in the spring ($\frac{\sigma_y}{\sigma_x}$ = .5), whereas the class in the lower right-hand corner is one in which the pupils are ordered about the same in spring and fall ($\underline{r}$ = .90), but the scores are more spread out in the spring ($\frac{\sigma_y}{\sigma_x}$ = 1.5). The first class has a larger intercept (8.5 compared to 3.25).

The intercept-value reflects changes both in the rank order of the pupils in the spring and fall and the variances of their scores in spring and fall. In the class in the lower right-hand corner, the pupils have increased their scores from fall to spring in varying amounts, but since the spring scores have a larger variance, the pupils at the upper end of the scale in the fall gained more than those at the lower end. In the class in the upper left-hand corner, the order of the pupils has changed but the scores are closer together in the spring than in the fall.

The pattern of change in these two classes is quite different even though the mean gain is the same for both classes. The intercept reflects such differences, but the pattern differences cannot be estimated correctly without also using information about the slope. Thus, if the intercept of one class is larger than another, we may conclude either (a) the rank-order of pupils in the two classes did not change, but one group's spring scores have a larger variance (read down a column); or (b) the rank-order may have changed but the ratio of variances may be equal (read across a row); or (c) both may be different for the two classes. The ambiguity about which of these possibilities has occurred is removed by checking the differences in slopes.

The above discussion and the accompanying tables should alert the reader to the variations in the patterns of change that may occur from fall to spring. No single statistic shows all these changes. Therefore, we will use a method for describing differences in the patterns of change among the classes which is sensitive to the changes in both the rank-order and the variances of the spring and fall scores.

It is obvious that simply evaluating the magnitude of r is not sufficient to describe differences in achievement among classes. All r's in this group are statistically significant, and with few exceptions are of substantial magnitude. Those of the least magnitude in this group are also those associated with large intercepts and shallow slopes. It will be useful to illustrate these differences with some examples.

Figure 8.1 presents the plot of four regression lines. The regression line for the total group is line A. Lines B and C are the regression lines with the smallest slope and the largest slope respectively (B:$\underline{b}$ = .60; C:$\underline{b}$ = 1.21). Line D is the line with the largest intercept; in this sample line C is also the line with the smallest intercept. (See Figure 8.1a.)

Since $\underline{b}$ and $\underline{c}$ are functionally related, a useful way to understand the array of data presented in Table 8.1 is to plot the values of $\underline{b}$ against those of $\underline{c}$. In Figure 8.2 two axes have been established, the vertical axis corresponds to values of the intercept and the horizontal axis corresponds to values of the slope. The values for $\underline{b}$ and $\underline{c}$ for each teacher have been plotted as coordinates against these axes. The resulting figure arrays all of the $\underline{b}$ and $\underline{c}$ values for all of the teachers. Each point represents a set of coordinates, $\underline{b}$ and $\underline{c}$, for each teacher. Thus the location of T86 ($\underline{b}$ = .60; $\underline{c}$ = 78.25) is plotted by going .60 units along the $\underline{b}$ axis and going vertically from this point to a point opposite 78.25. Note that T86 and T22 appear at the top of this array because they have large intercept values and relatively small slopes. Note also that T11 appears at the bottom of the array because T11's regression line has the largest negative intercept and the largest slope. Note the point located approximately in the middle of this array labeled T. This point represents the plot for the regression line for the total group ($\underline{b}$ = .90; $\underline{c}$ = 31.75).

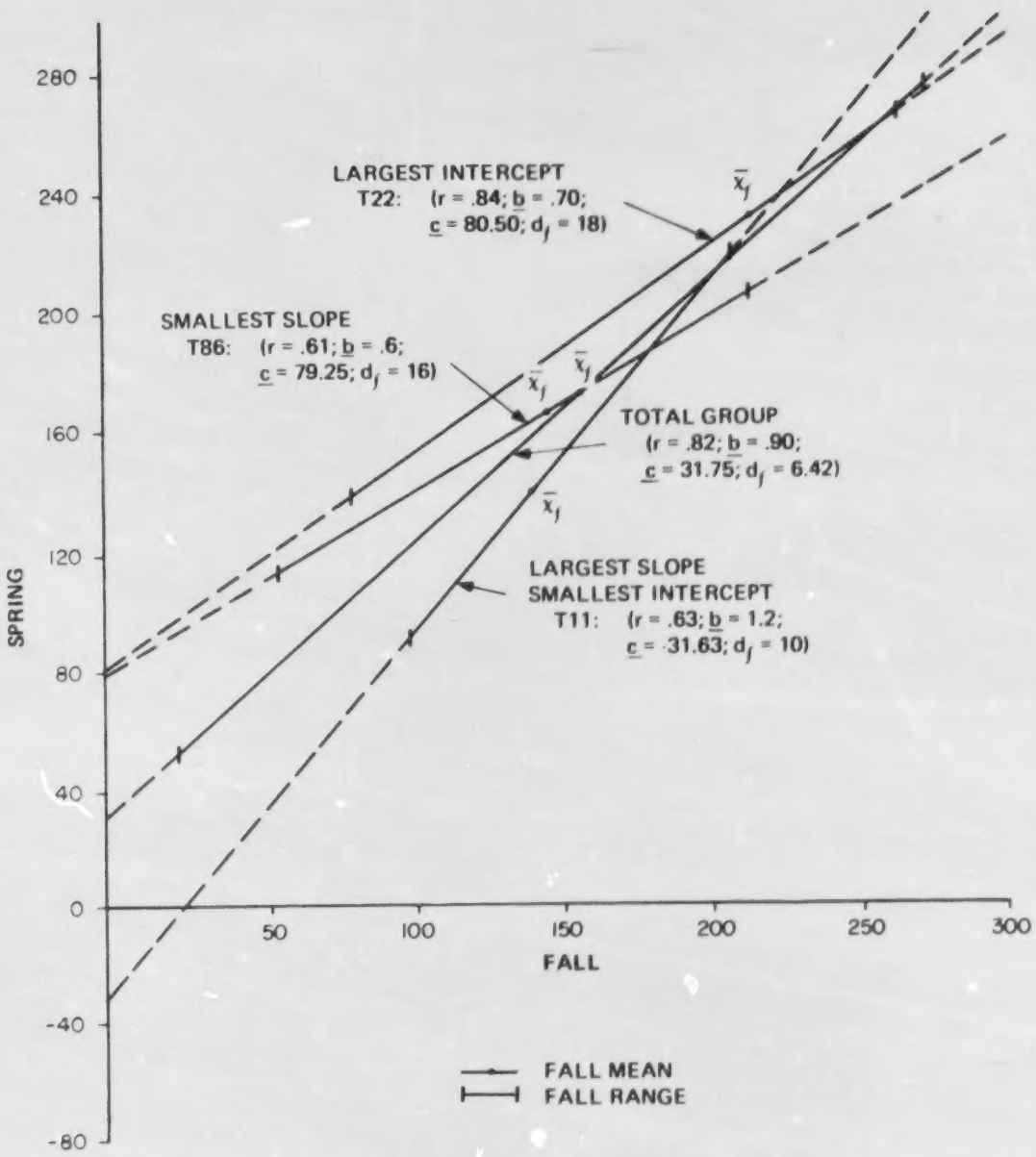
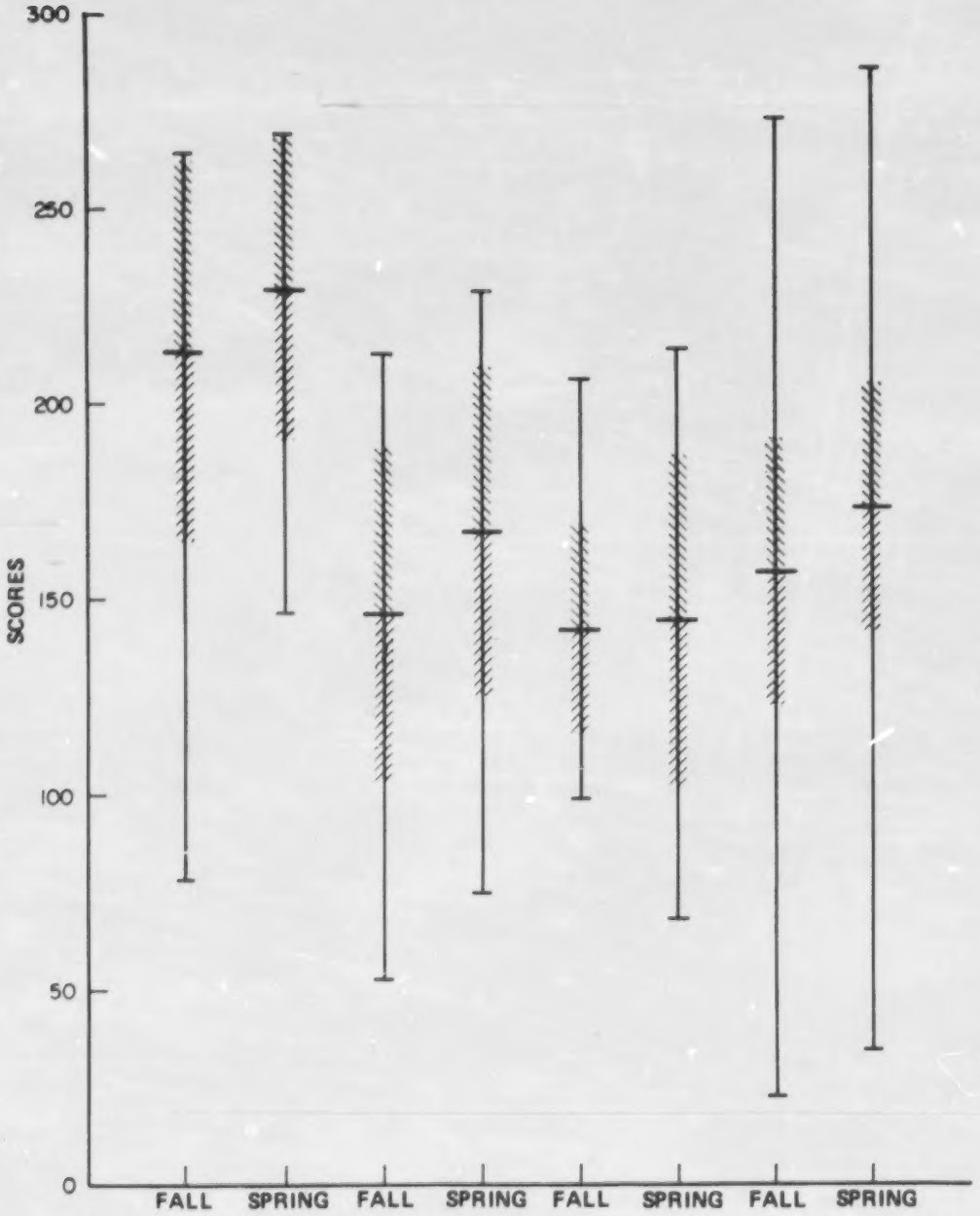


Figure 8.1. Regression Lines for Selected Classes and Total Group: Grade 2 Reading



	T22	T86	T11	TOTAL GROUP
$\bar{X}_f$	212.84	145.89	141.96	156.27
SD_f	49.49	43	27	34
R_f	78.11 – 263.61	53.35 – 212.63	99.10 – 206.03	22.11 – 272.94
$\bar{X}_s$	229.61	166.61	144.10	173.20
SD_s	39	42	43	37
R_s	145 – 269.20	74.80 – 228.90	67.72 – 215.58	34.31 – 286.01

Figure 8.1a. Fall and Spring Means, Standard Deviations and Ranges for Selected Classes and Total Group: Grade 2 Reading

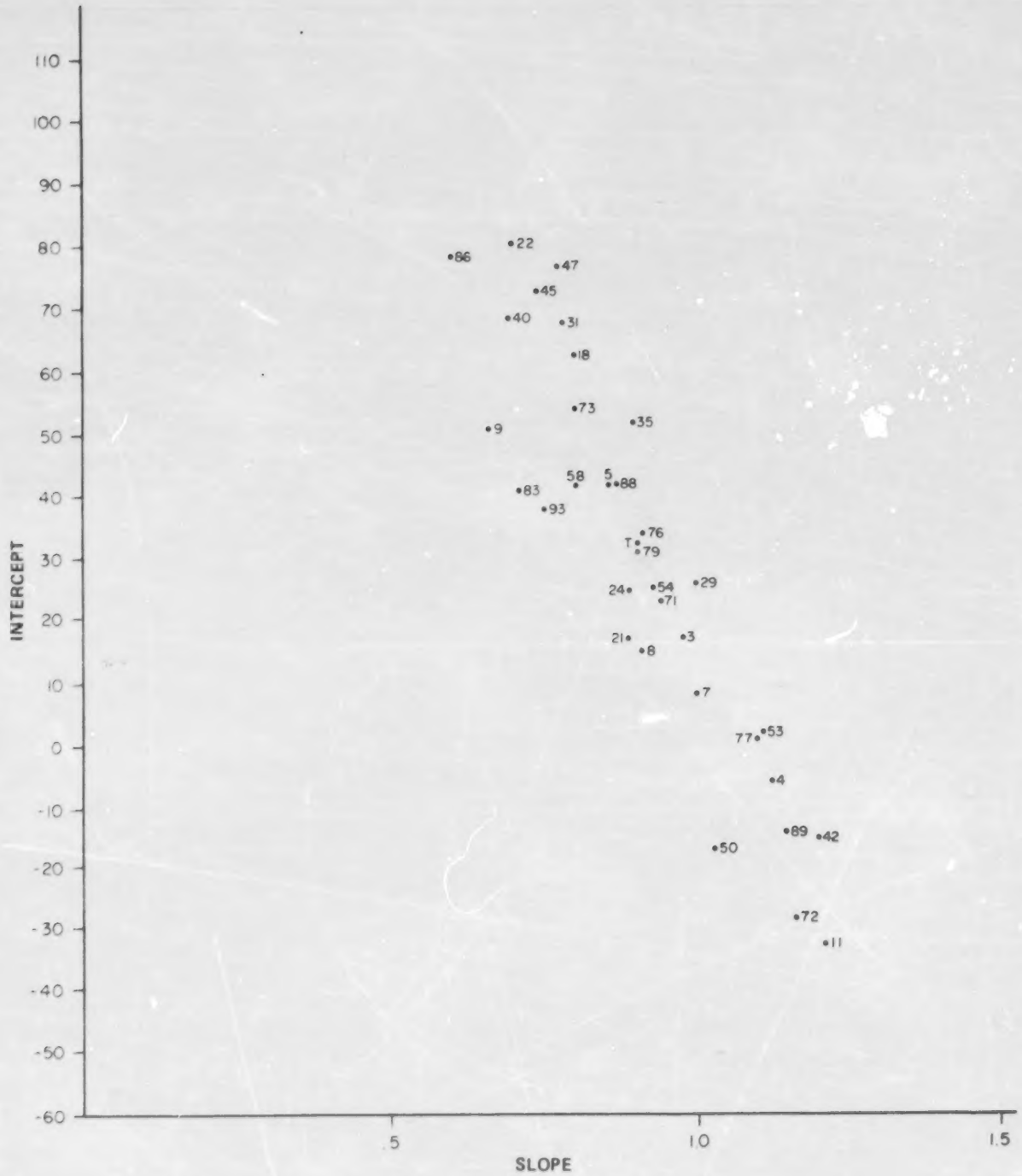


Figure 8.2. Slope (b) Plotted Against Intercept (c) For Each Teacher; Grade 2 Reading (N = 33)

Logically one would expect to find regression lines with large intercepts and large slopes, large intercepts and small slopes, small intercepts and large slopes, and small intercepts and small slopes. In this sample of teachers not all of these four possibilities occur. Near the top of the array we have classes with relatively shallow slopes and large intercepts, and near the bottom of the array we have a group of classes with small intercepts (in this case some with negative intercepts) and relatively large slopes. Near the middle are a group of classes whose regression lines have slopes from .70 to 1.00 and intercepts from 0 to approximately 45.

It will be useful to consider again the meaning of the variation in slopes and intercepts. In this sample of classes the pattern of changes over the course of the year in reading is one in which the changes among one group of classes are substantial, but the rate of change is not markedly different at all levels of the score scale (see T22, Figure 8.1). Another group of classes has made relatively small changes but the greatest positive changes have been made by those pupils who were initially at the high end of the scale (see T11, Figure 8.1). The sample of classes does not produce an instance where there are small positive changes occurring approximately equally across all levels of the score range ($\underline{b} < 1$, $\underline{c} < 10$); nor does it produce instances of classes where large positive changes are made but

relatively larger increases in scores are made at the high end of the score intervals ($\underline{b} < 1$, $\underline{c} < 60$).[4]

The general pattern of performance seems to be that some classes are making large gains in reading and the gains are being achieved by all of the students in the class about equally. In other classes larger gains are made only by students at the higher score intervals but the mean difference is relatively small.

Table 8.3 presents the data which will illuminate these differences. In that table the mean, standard deviation, and range is given for the fall scores and the spring scores as well as the mean difference and the

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[4] A class could not make large gains across its initial score range if the test did not have sufficient top; large gains might have been made at the lower end, but gains at the upper end would be limited because those at this end in the fall had fewer items they could answer correctly in the spring. In reading at the second grade a higher level of the California Achievement Test, one component of the total score, was used because some pupils were near the upper limit of scores in the fall. This change effectively extends the scale for this portion of the total score.

The Reading Achievement and Reading Applications tests, specially constructed for this study, were revised for the spring testing by removing the most difficult items and the easiest items. The criterion for selecting difficult items to remove was that less than 10 percent of the pupils had passed the item (since all items had five alternatives, the probability of getting a correct answer by chance was .20). If such apparently difficult items had been left in the test, the "true" or effective ceiling would have been less than 300. Items of lesser difficulty were substituted for these "extremely difficult" items, thus maintaining an effective ceiling of 300. No pupil had a perfect score on the spring test.

Note that for T22, the uppermost line in Figure 8.1, $\bar{X}_f = 212.84$, and the range is 78.11 to 263.61; and $\bar{X}_s = 229.61$, and the range is 145.93 to 269.20. The range has been reduced by approximately 60 points from fall to spring ($SD_f = 48.71$; $SD_s = 16.76$). Some large gains occurred at the lower end; there was a relatively small shift at the upper end of the range. One possibility is that an effective ceiling less than 300 is still in the spring test. The plausibility of this argument, however, is contradicted by the fact that nine other classes had higher scores at the upper ends of their spring ranges (see Table 8.3).

Table 8.3

Fall and Spring Means, Standard Deviations, Ranges, Mean Difference and Standard Deviation of the Mean Difference for Each Teacher-Pupil Group for Grade 2 Reading - N = 35

T#	$\bar{X}_f$	SD_f	R_f	$\bar{X}_s$	SD_s	R_s	Mean Diff.	SD_{s-f}
03	148.38	49.19	82.00 - 240.09	163.25	55.49	79.88 - 234.67	14.87	27.25
04	162.51	53.47	57.19 - 234.53	177.93	65.85	58.81 - 251.72	15.42	25.67
05	109.63	54.52	45.42 - 224.30	136.39	56.17	55.24 - 233.10	26.76	31.79
07	163.35	55.21	72.80 - 245.37	171.27	59.63	85.14 - 246.59	7.92	22.58
08	129.76	39.08	75.47 - 216.39	132.58	47.00	70.45 - 229.24	2.81	31.06
09	99.34	28.55	61.93 - 170.43	116.49	39.87	66.04 - 196.28	17.15	36.55
11	141.96	26.60	99.10 - 206.03	144.10	42.98	67.72 - 215.38	2.13	35.80
18	116.48	45.91	40.16 - 245.70	156.12	56.52	34.33 - 263.84	39.64	43.77
21	125.46	33.44	67.33 - 194.17	127.94	40.18	78.41 - 213.23	2.48	27.39
22	212.84	48.71	78.11 - 263.61	229.61	38.92	145.93 - 269.20	16.76	24.55
24	175.62	31.58	118.67 - 222.50	181.31	38.80	111.29 - 236.76	5.69	26.91
29	157.30	44.39	82.11 - 228.97	182.57	52.66	106.06 - 280.13	25.27	28.66
31	142.89	58.51	22.11 - 236.07	178.48	53.74	91.07 - 255.68	35.59	31.62
35	116.15	37.24	67.48 - 183.81	157.30	47.13	67.11 - 222.03	41.14	33.20
40	159.38	40.23	81.69 - 251.26	179.71	44.46	73.33 - 243.49	20.33	36.75
42	140.78	45.53	81.02 - 222.83	154.38	65.29	71.77 - 280.31	13.61	36.82
45	181.38	46.97	84.66 - 263.61	207.81	42.83	107.82 - 275.65	26.44	27.56
47	183.07	49.74	79.09 - 262.69	217.42	47.62	94.40 - 286.01	34.36	30.79

Table 8.3 (Continued)

T#	$\bar{X}_f$	SD_f	R_f	$\bar{X}_s$	SD_s	R_s	Mean Gain	SD_{s-f}
50	174.58	60.28	37.51 - 257.73	176.05	54.61	92.67 - 280.31	1.46	35.56
53	125.96	42.01	49.88 - 222.77	142.11	58.43	74.13 - 241.54	16.15	35.57
54	130.19	47.24	72.47 - 243.48	145.93	59.90	42.47 - 261.14	15.74	40.88
58	162.95	51.38	84.66 - 241.30	172.51	58.32	52.69 - 263.64	9.56	42.75
71	213.95	25.04	177.75 - 272.94	223.25	41.51	148.72 - 274.43	9.29	34.32
72	203.22	42.58	84.00 - 261.18	208.84	56.62	68.11 - 280.45	5.62	28.31
73	168.13	53.40	95.02 - 257.73	188.43	59.77	72.52 - 280.13	20.30	43.07
76	178.00	43.72	106.79 - 263.29	195.77	50.20	56.52 - 255.58	17.77	30.85
77	194.21	33.94	114.85 - 246.62	214.84	45.71	117.47 - 268.18	20.63	26.62
79	202.15	37.24	129.42 - 263.29	213.58	43.75	110.90 - 274.43	11.43	28.28
83	143.20	38.59	72.71 - 222.11	142.68	43.49	77.93 - 228.58	- 0.53	35.53
86	145.89	42.86	53.35 - 212.63	166.61	42.25	74.80 - 228.90	20.72	37.72
88	178.34	40.43	86.58 - 232.05	198.21	39.10	96.44 - 240.29	19.87	17.42
89	149.04	42.08	92.79 - 212.87	157.37	54.83	67.96 - 244.83	8.33	26.32
93	138.27	37.69	80.04 - 210.51	140.74	49.43	47.22 - 208.25	2.47	41.76

	$\bar{X}_{mf}$	SD_{mf}	R_{mf}	$\bar{X}_{ms}$	SD_{ms}	R_{ms}
TOTAL GROUP	156.27	34.03	75.26 - 219.67	173.20	31.78	116.49 - 230.43
		$\sigma_{e_{mf}}$			$\sigma_{e_{ms}}$	
		5.75			5.37	

standard deviation of the mean difference. Note the range in fall means; for example, T09: $\bar{X}_f$ = 99.34; and T71: $\bar{X}_f$ = 213.95. Similar spreads are apparent in standard deviations and ranges. The mean differences range from -0.53 (T83) to 41.14 (T35).

When a classes' spring score is graphed as a linear function of the classes' fall score, the graph is determined by two constants, an intercept and a slope. The intercept indicates what the spring score would be for a zero (0) fall score[5] and the slope indicates the relative increase to be expected in the spring score for an increase of one (1) unit in the fall score. To state by example: if we say that the line has an intercept of 80 and a slope of .90, this means that a score of 0 in the fall "predicts" a score of 80 in the spring; and for every increase of one (1) unit in the fall score, the corresponding increase in the spring score is .9 of a unit.

The Relative Effectiveness of Learning Experiences

How can these graphs be used to classify the relative learning gains of classes? Suppose the same test is given in the fall and in the spring. If all the students score exactly the same in the spring as in the fall, then the graph will have an intercept of 0 and a slope of 1. Call this graph with intercept 0 and slope 1 the reference graph (see Figure 8.3).

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[5] Among the actual scores of course there are no zero mean scores for any group. The intercept of any regression line represents the intersection of the projected regression line and the Y-axis (spring-score axis). Some readers may think that the intercept, therefore, is an exaggerated estimate of the differences among the classes because the fall means of the classes are different. This list is a set of fall means and intercepts; the set was selected by picking progressively larger fall means, each at approximately the middle of a ten-point score interval: (99.54, 51.37), (109.63, 42.02), (116.48, 62.55), (125.96, 2.46), (138.27, 37.56), (145.89, 79.25), (157.30, 26.03), (163.35, 7.99), (175.62, 24.72), (183.07, 77.06), (194.21, 1.35), (203.22, -27.54), (213.95, 23.17). As can be seen there is no relation between the fall means and the intercept of the regression line.

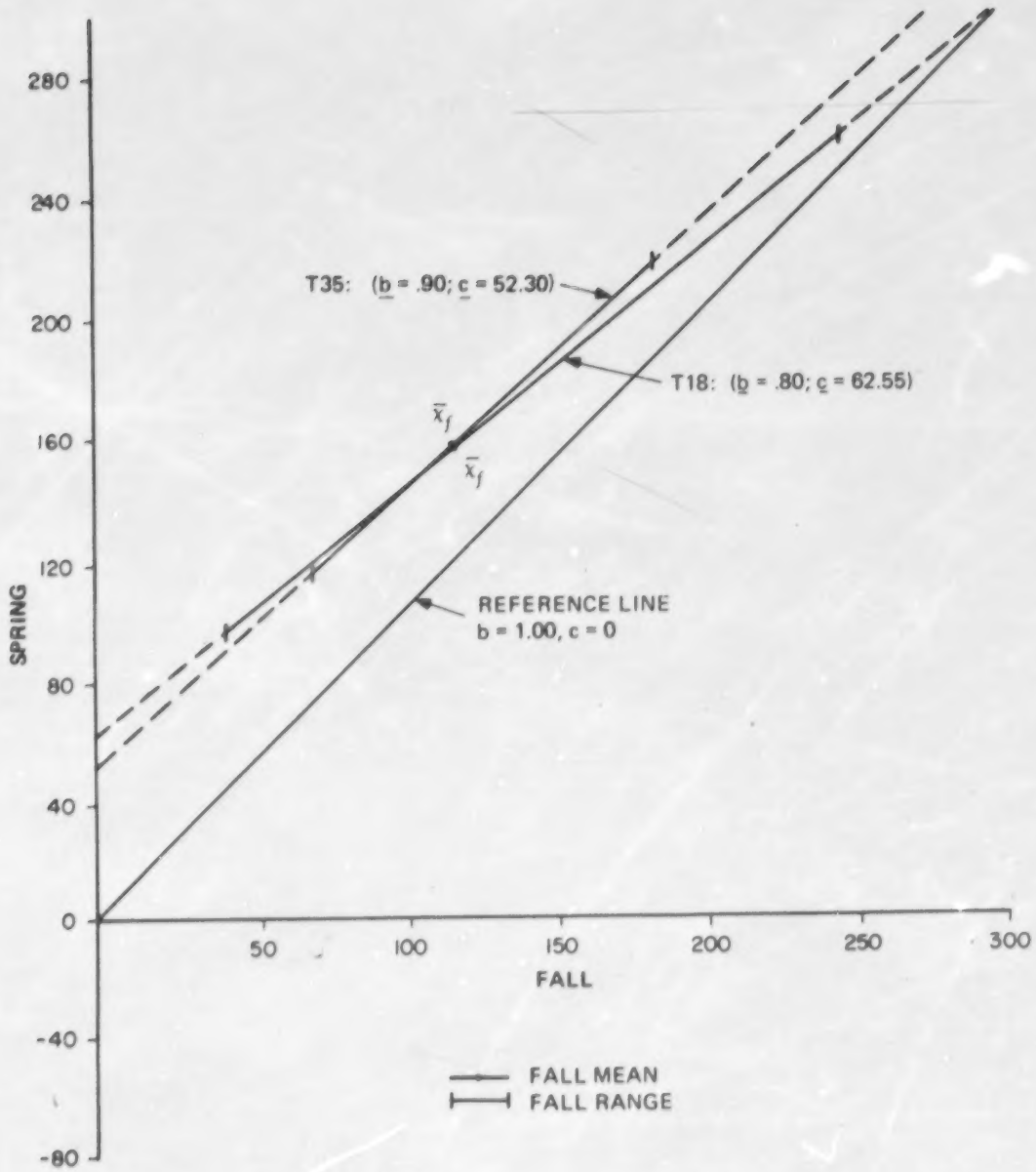

Figure 8.3. Regression Lines for Two Groups Classified in Top Teaching Group – T_{18} and T_{35}

Suppose that every student in a class had a gain of 20 points; then this graph would have an intercept of 20 points and a slope of 1. This class has obviously had a more effective learning[6] experience than the class represented in the reference graph. We then state, as a generalization, that a class A has had a more effective learning experience than a class B if the graph of class A is always above the graph of class B.

We note that this relative effectiveness is easy to determine when classes have the same slope. However graphs with different slopes eventually cross over so that part of class A would have gains relative to class B and part have losses. First we remark that the scores have a definite range set by the score-possibilities of the test (in the case of the illustrated total reading and total mathematics scores, 0 to 300). We will say that class A has had a more effective learning experience than class B if, in this range, the graph of class A always lies above the graph of class B. Even so it is possible that within this restricted range there will be crossovers between classes.

We shall now set an arbitrary, but not necessarily unreasonable, condition; no class had a more effective learning experience than the "reference class" if it has a negative intercept. This statement implies that any class that has had losses in the lower scores cannot have had an effective learning experience as a class (obviously some students showed

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[6] We ignore in this discussion the "causes" of the more effective learning experience. It may be the result of effective teaching or superior aptitude or some combination of such factors.

gains in their scores). We have picked a reference class, one with no score change and defined what will be called a class which had had an effective learning experience; namely, it must be one that shows gains in the lower scores.

Suppose there are two classes that both have had an "effective learning experience" relative to the reference class and the graphs of the two classes cross; which is "better"? Here we look to see which line is above the other over the largest part of the range. You will note that this criterion will classify a class as having had a more "effective learning experience" than another class that also has had an "effective learning experience" (even if the intercept of the first class is lower) as long as there has been gain in the low scores, as well as at other points on the score interval. In these classes the amount of mean difference is accumulated by positive changes at all score intervals.

In Figure 8.2 the points representing each teacher differ in two ways: (1) one is higher than another with respect to the intercept-axis; (2) one is further to the left than another with respect to the slope-axis. In general points which are further to the left with respect to the slope-axis represent classes in which larger gains have been made at the lower end of the score scale. Therefore in deciding which class had a "more effective" learning experience or opportunity, one first looks for points which are further to the left; that is, one identifies groups with smaller slopes.

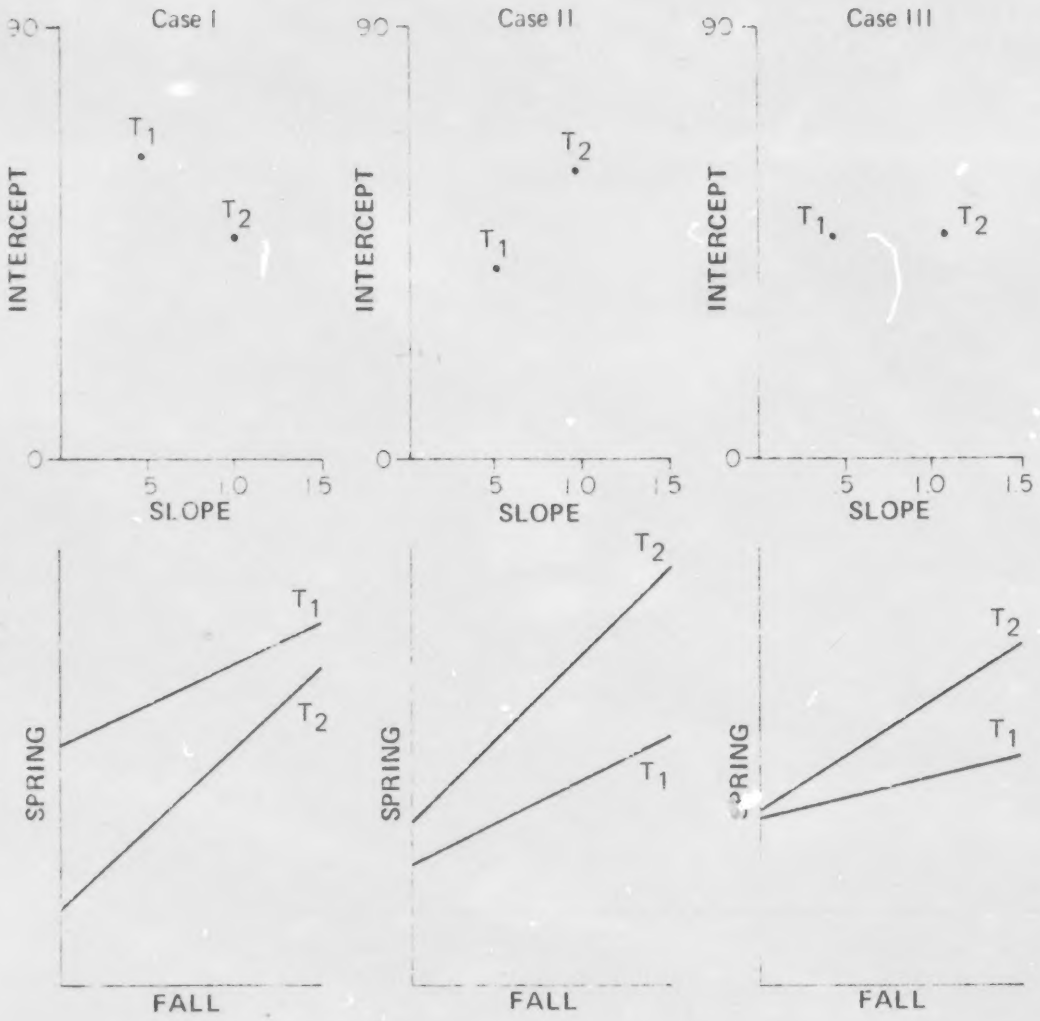
But, the groups also differ in the relative magnitudes of their intercepts, a group with a larger intercept being higher along the intercept-axis. Therefore, in general, points to the left with respect to the slope-axis and higher with respect to the intercept-axis are ranked higher (Case I, see below).

If two points have the same intercept, but one has a smaller slope, it is ranked higher (Case III). An unusual case occurs where the intercept of a point is lower, but its slope is also smaller than another point (Case II). In this case the second point (intercept higher, slope larger) is ranked higher because larger gains are being made in this group at the lower end of the score intervals.

Thus, the general principle is that T_1, is ranked above T_2 if the gains at the lower end of the score scale are greater for T_1 than for T_2. These gains will be greater if T_1 is higher and to the left of T_2. They will also be greater if the intercept of T_1 is somewhat smaller than that of T_2, but if T_2 has a slightly larger slope than T_1.

There is a third possibility: both points have the same intercept, but one has a larger slope (is placed further to the right). In this case the point with the large slope r is ranked higher, again because its positive changes at the lower end will be larger.

The three cases may be represented as below. The upper row of diagrams represent how the points would appear in the slope-intercept graph (as in Figure 8.2). The lower row represents the corresponding graphs



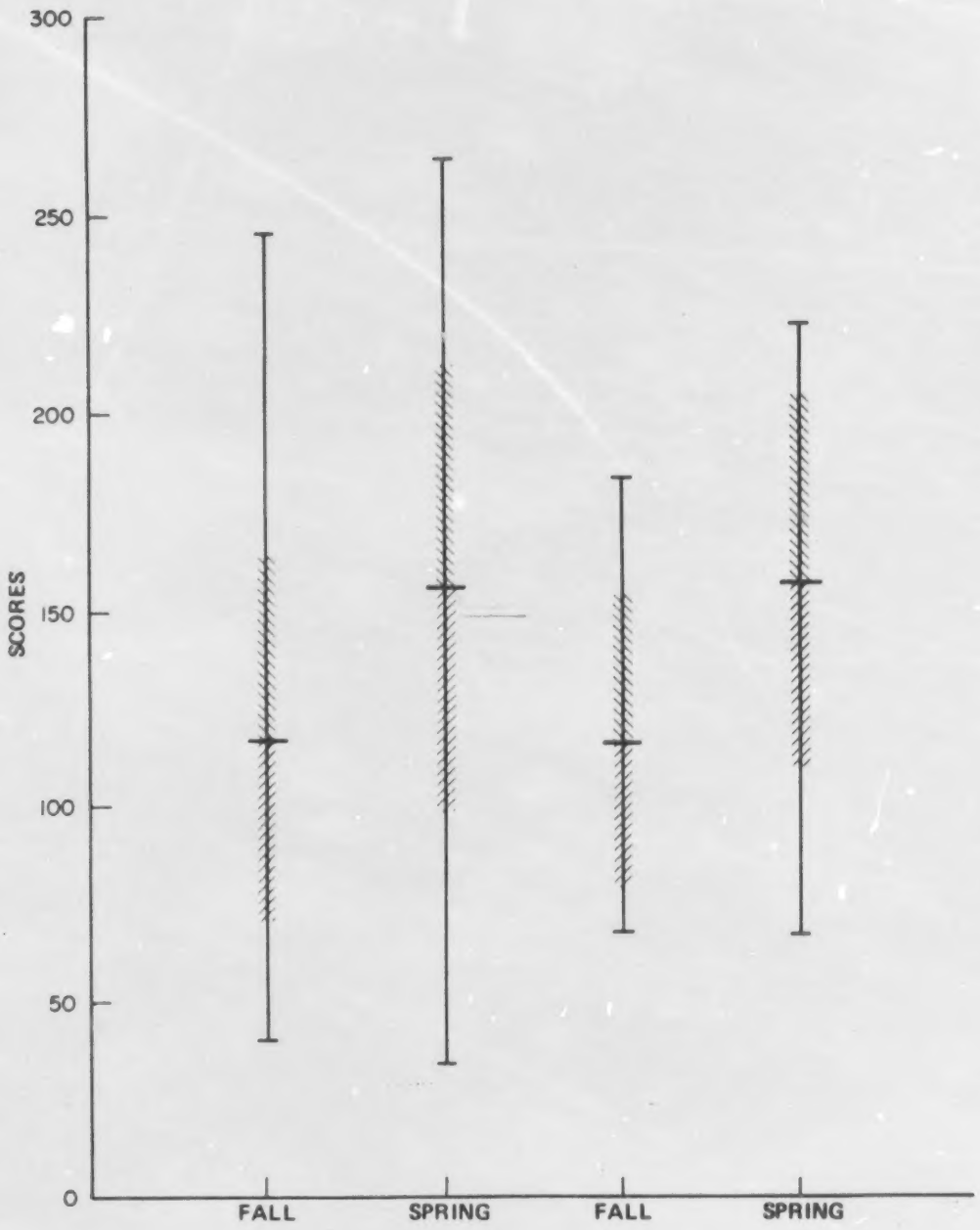
of their regression lines. Note that the principle of choice always ranks higher the group with greater changes at the lower end of the score-interval scale.

These principles could produce a rank-order of the groups. They were used, however, only to determine which groups were in the top and bottom ten classes. Beginning at the top left-hand corner of the slope-intercept graph (Figure 8.2), groups were selected using these principles until a set of ten was completed; in a similar manner, the bottom ten were selected by beginning in the lower right-hand corner, using the principles stated above in reverse (i.e., selecting groups with larger slopes and smaller intercepts).

Using these criteria over the potential range of our scores we classified the classes into the ten highest, ten lowest and the remainder in a middle group. We coded the ten most effective plus one (+1), the ten least effective minus one (-1) and the remainder zero (0). This method separates out classes (or teachers) on the basis of the patterns of differences in the spring and fall scores. It takes into account such changes as the difference in variance of the spring and fall scores, where changes in scores occurred along the range of fall scores and the amount and direction of these changes. Consider these two examples, T18 and T35, and the following data; see also Figure 8.3a:

	df	$\bar{X}_f$	X_s	$\bar{X}_{s-f}$	SD_f	SD_s	$\underline{b}$	$\underline{c}$
T18	19	116.48	156.12	39.64	45.91	56.52	.80	62.55
T35	10	116.15	157.30	41.14	37.24	47.13	.90	52.35

These two groups of pupils began at the same point in the fall. Those taught by T18 were spread further apart in the spring than were the pupils taught by T35; both classes made gains, the mean change of T35's pupils being somewhat larger than that of T18's pupils. Their mean spring scores



T18		T35	
$\bar{X}_f$	= 116.48	$\bar{X}_f$	= 116.15
SD_f	= 46	SD_f	= 37
R_f	= 40.16 - 245.70	R_f	= 67.48 - 183.81
$\bar{X}_s$	= 156.12	$\bar{X}_s$	= 157.30
SD_s	= 57	SD_s	= 47
R_s	= 34.33 - 263.84	R_s	= 67.11 - 222.03

Figure 8.3a. Fall and Spring Means, Standard Deviations and Ranges for Selected Classes in the Top Teaching Group: Grade 2 Reading

are practically identical. With the exception of the differences in variances between spring and fall, the two groups of pupils seem almost identical in terms of where they began and where they ended. From these data an appropriate inference is that both groups had comparable learning opportunities.

But the differences in variances suggest that the patterns of differences within the groups is not identical. Consider these data:

	R_f	R_s	$\underline{r}$	$\underline{b}$	$\underline{c}$
T18	40.16 - 245.70	34.33 - 263.84	.65	.80	62.55
T35	67.48 - 183.81	67.11 - 222.03	.71	.90	52.35

In the fall T18's pupils' scores covered a greater spread of scores (205.54 score points) than did T35's pupils' scores (116.33). In the spring T18's pupils' scores were spread somewhat further than in the fall (229.51 score points); and T35's pupils' scores were also more spread out in the spring (154.92 score points). The standard deviations for fall and spring also show this difference (see SD's on preceding page).

Note that the $\underline{r}$ between fall and spring scores is also not equal (T18: $\underline{r}$ = .65; T35: $\underline{r}$ = .71). The differences in variances and $\underline{r}$ is reflected in the differences in slopes (T18: $\underline{b}$ = .80; T35: $\underline{b}$ = .90) Even though there is at least one score in the spring below one in the fall in each class, greater gains are made at the lower end of the scale in T18's group than at the lower end of T35's scale. Figure 8.3 illustrates these differences. Take a fall score point below 100, say 90. A pupil in T18's group with a score of 90 will have a Y'-value (the point on T18's

regression line directly above X = 90) greater than the corresponding Y'-value for T35 (see graph). Within the range of the actual scores, the direction of the Y' differences is the same at the high end of the scale. Thus for equivalent points within their comparable ranges, pupils in T18's group will generally have higher scores in the spring.

The method for ordering the groups takes into account such differences. Refer back to Figure 8.2, and observe that T18 is located above T35. Thus this method of sorting identifies one group as higher than another if for equivalent points within their ranges, the regression line of one falls above the other at the lower end of the score scale.

These two groups, T18 and T35 are, however, highly similar. They are more like each other than they are like the groups in the lower portion of Figure 8.2. The utility of the method to detect differences in patterns of change is illustrated by comparing T22 and T72.

	df	$\bar{X}_f$	$\bar{X}_s$	$\bar{X}_{s-f}$	SD_f	SD_s	SD_{s-f}	b	c
T22	18	212.84	229.61	16.76	48.71	38.92	24.55	.70	80.50
T72	21	203.22	208.84	5.62	42.58	56.62	28.31	1.16	-27.54

These two groups had about the same mean score in the fall, but T22 had a much larger mean gain than T72. For T22 the variances have decreased between fall and spring; but for T72, they have increased. The relative variance, $V = \frac{SD}{\bar{X}}$, also shows (when $SD_{\bar{X}_{s-f}}$ and $\bar{X}_{s-f}$ are used in this formula) differences in the pattern of mean gains; for T22: V = 1.5, and for T72: V = 5.04. Thus, two groups which began at about the same point in the fall, end about at the same point in the spring, but the patterns of change are quite different. These differences are further illustrated by these data:

	R_f	R_s	r	b	c
T22	78.11 - 263.61	145.93 - 269.20	.84	.70	80.50
T72	84.00 - 261.18	68.11 - 280.45	.87	1.16	-27.54

The lower end of T22's range has shifted upwards by 67.82 score points; its upper end, by 5.59 score points. For T72, the lower end has shifted downwards by 15.89 score points, and the upper end has shifted upwards by 19.27 score points. These changes are apparent in the differences in variances in fall and spring (see SD's preceding page and Figure 8.4a).

Figure 8.4 shows the regression lines for T22 and T72. At any point along the score range, the predicted-value of the spring score, Y', will always be higher for T22 than for T72. Thus, the difference in slope and intercept are indicators of differences in the pattern of differences between fall and spring.

In the previous example, T18 and T35 were classified in the same group; in this example T22 and T72 fall in different groups. The greater the differences in slope and intercept, the more marked the differences in patterns of changes.

The reader should not conclude that we considered this classification the indisputably "best" way of grouping classes for all data sets. Our classification scheme could penalize to some degree a class that had very high fall scores since there is a ceiling of three hundred on the total score. We did not first sort classes by differences in the ranges of their fall scores; hence, there was a possibility that classes that showed improvement for every student in the class would be classified lower than classes showing losses for every student in the class. But this case did not occur in these data.

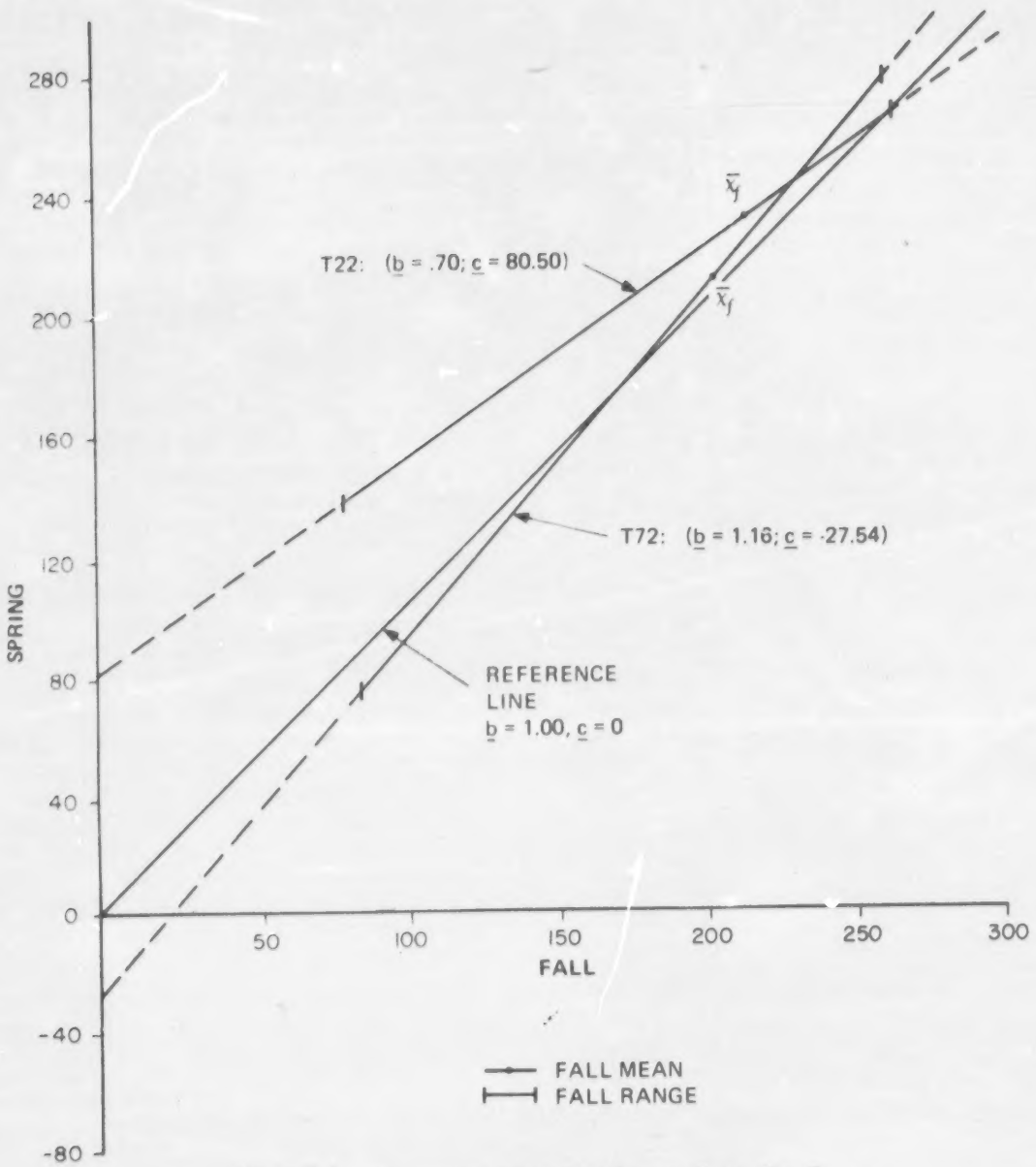


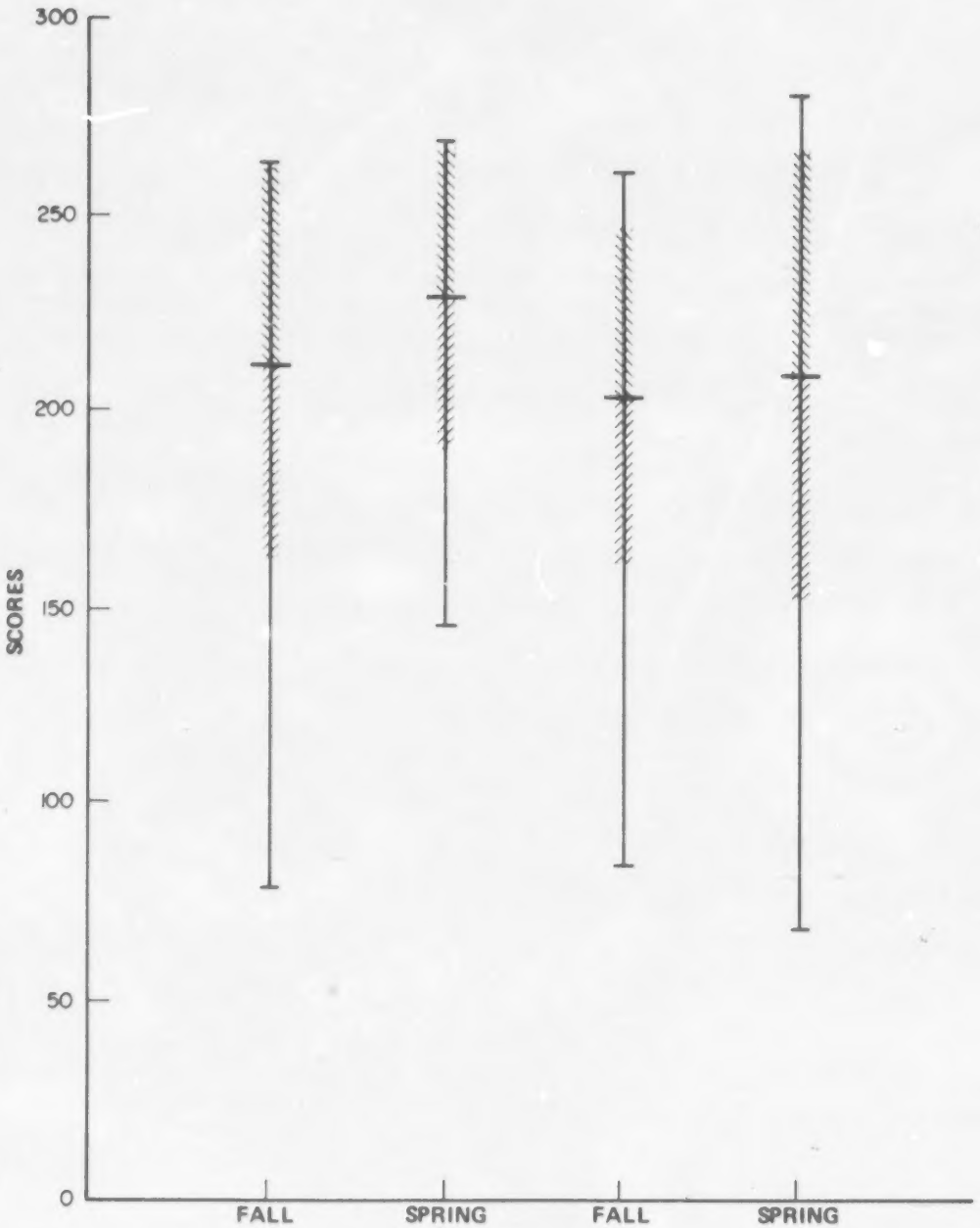
Figure 8.4. Regression Lines for Two Groups, One in Top Group, One in Bottom Group – T22 and T72

An example of a difference of this kind is presented in Figure 8.5. Class A would have been classified as higher using our criterion because gains have been made at the lower end of the score interval. But class B's initial scores are higher than A's and the range of its gains are more restricted. Since B's scores are approaching the upper limits of the score interval, there is no way for class B to show large gains at either end of its range. Its intercept is negative and its slope is greater than one. Actually all students in class B gained.

As previously stated, this case did not occur in these data. Other data sets may yield instances of the kind discussed in this example. In such cases it might be useful to sort groups first by the range of scores in the fall, and then sort by the slope-intercept method used here. This procedure would then compare changes within comparable score ranges. A larger sample of teachers might produce the instances which were not found in this study, and in such a larger sample the sorting procedure just described might produce enough cases for comparisons within similar ranges and across different ranges.

In these data the criteria for sorting classes produced three groups in which the patterns of change were different. We will describe these differences in greater detail in the following pages, but first we will show that the sorting procedure did not produce anomalies of the kind just discussed.

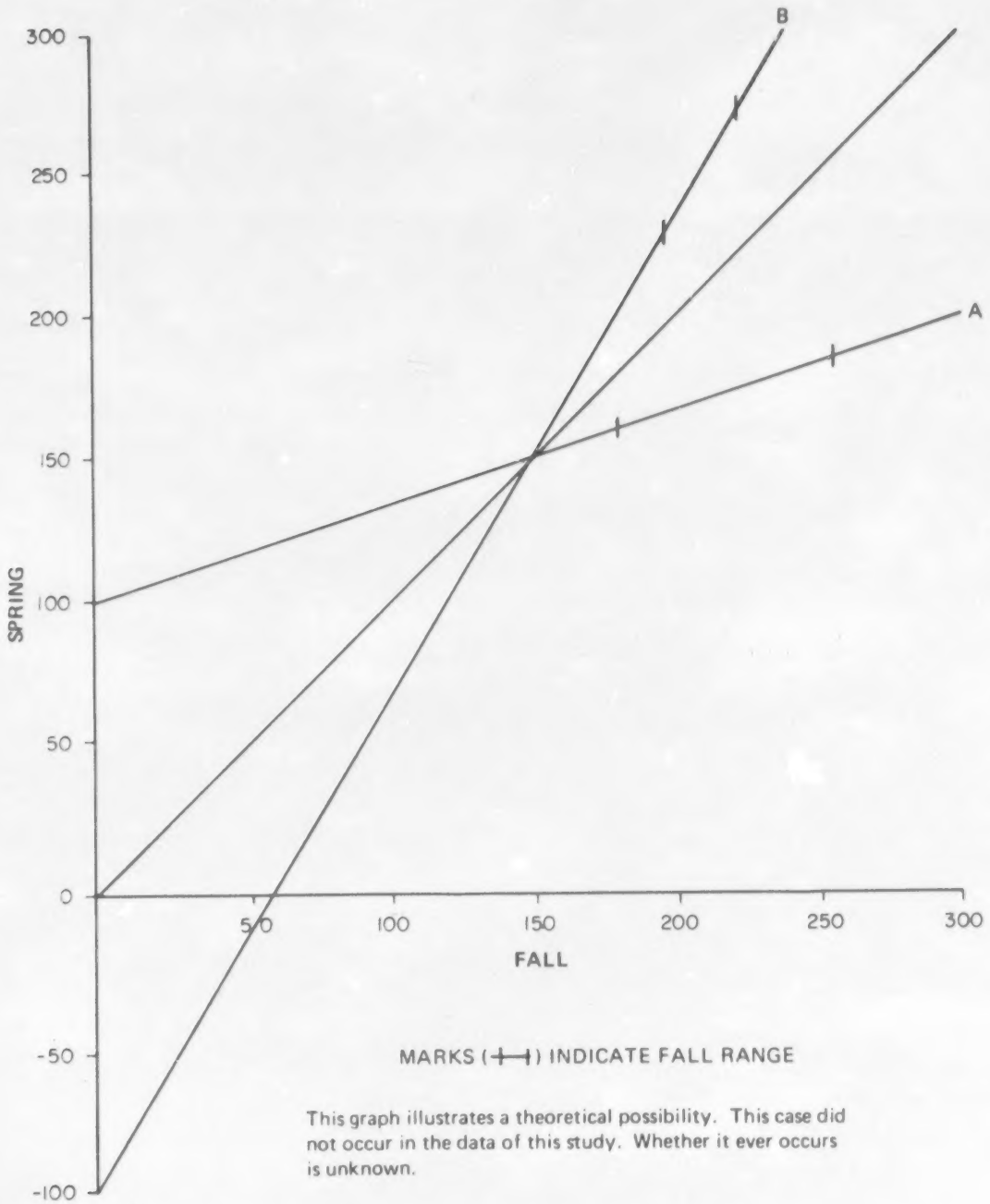
Figure 8.6 presents the graphs of the top and bottom five classes so classified by the criterion we used. Note the reference graph in each diagram ($\underline{b} = 1$; $\underline{c} = 0$). Points on the line of a class's graph indicate the range of its fall scores.



T22		T72	
$\bar{X}_f$	= 212.84	$\bar{X}_f$	= 203.22
SD_f	= 49	SD_f	= 43
R_f	= 78.11 - 263.61	R_f	= 84.00 - 261.18
$\bar{X}_s$	= 229.61	$\bar{X}_s$	= 208.84
SD_s	= 39	SD_s	= 57
R_s	= 145.93 - 269.20	R_s	= 68.11 - 280.45

Figure 8.4a. Fall and Spring Means, Standard Deviations and Ranges for Selected Classes – One in the Top and One in the Bottom Group: Grade 2 Reading

Graph of Class A Classified Better Than Class B on Potential Range Criterion When B Would Have Been Classified Higher in Terms of An Actual Range Criterion.



This graph illustrates a theoretical possibility. This case did not occur in the data of this study. Whether it ever occurs is unknown.

Figure 8.5. Reference Graph

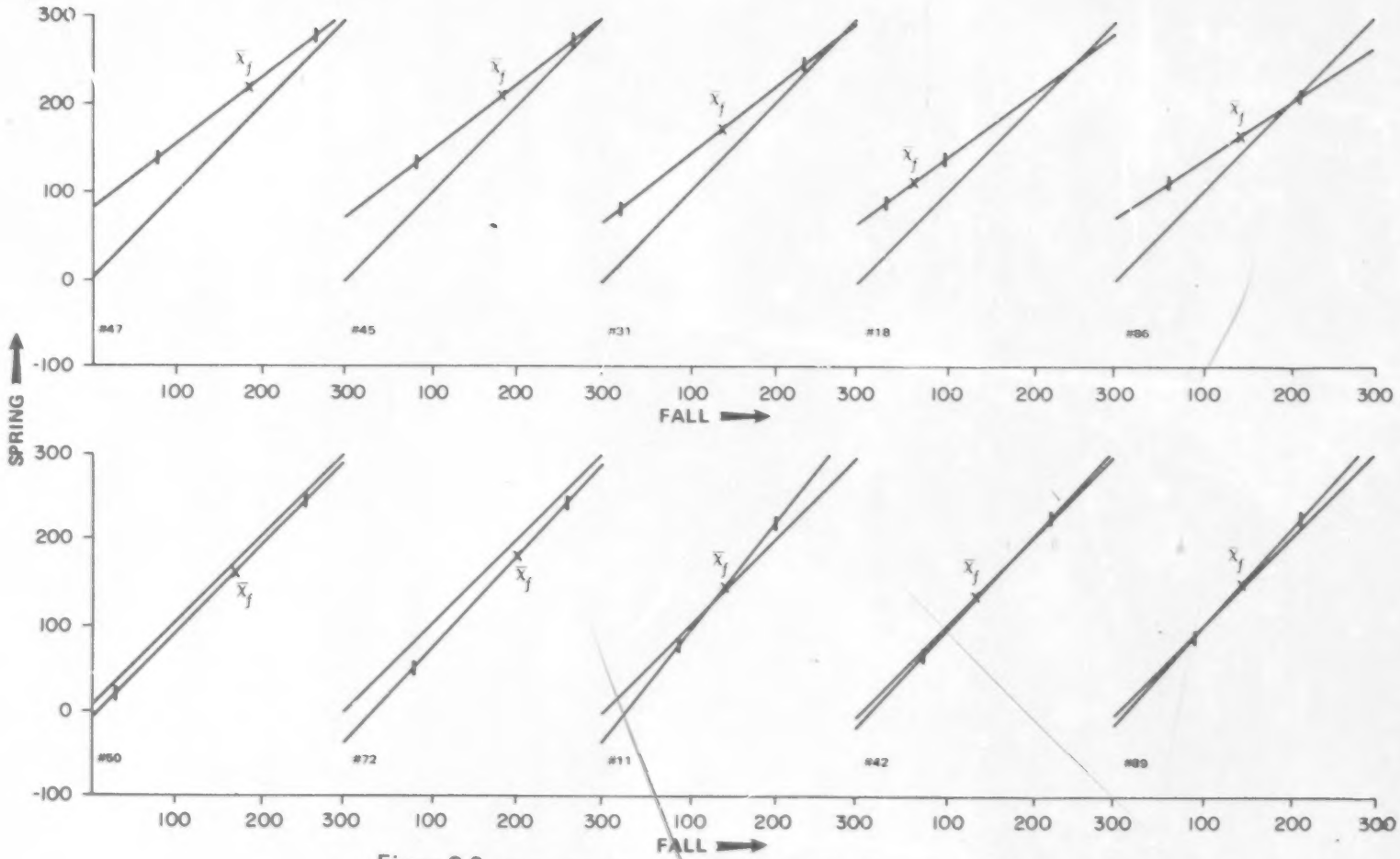


Figure 8.6. Regression Lines of Top and Bottom Five Classes Plotted Against the Reference Graph Grade 2 Reading

Note when comparing lines in each column that the intercepts differ markedly. The slopes of the lower graphs are steeper. We do not have a case here where a class in the bottom five is being obviously penalized because its fall range was near the upper end and numerically small.

Compare T47 and T50. T50's class has a larger range; potentially there is more room for gain at the lower end of the score range. T86 and T89 are interesting contrasts because their fall ranges are similar.[7] Although we have stressed the potential limitations of the criterion for classification, the criterion presented no problems in these data for Grade 2 Reading.

If differences of this kind found in these data are attributable at least in part to teaching performance, a case for the criterion of classification can be made on conceptual grounds. The teacher whose class has made positive changes across the range of scores could have a greater diversity of teaching skills. He or she presumably adapted his or her teaching performance to differences in the students' initial performance level. Thus by contrasting the performances of the top and bottom ten teachers we are more likely to identify a broader range of effective teaching skills.

But teachers whose classes were initially high might also possess all of these skills. If the bottom ten classes were all classes which were initially high, we might not find differences in the teaching performances of the two

[7] When time permits, we intend to reclassify the classes using a somewhat different criterion of change. One such criterion is to measure the proportion of potential change each student made and to classify on this basis. Note, that if the highest possible score is 300, and student A has a fall score of 100 and a spring score of 200, and student B has a fall score of 290 and a spring score of 295, these students will have made the same percentage gain.

groups. But the lower ten classes in this sample have a spread of scores across the score intervals. The differences between the top and bottom ten classes are not related to initial scores; this fact is illustrated in Table 8.4. Therefore, if differences in teaching performances are found between the two groups, we are likely to find those performances effective with students who initially are at all points along the range.

For reasons of convenience the class regressions were plotted on a graph with the intercept on the ordinate and the slope on the abcissa (see Figure 8.2). With a piece of graph paper for sketching where two classes' graphs intersect, it is then very straightforward to use our criteria for picking the classes where the "most effective learning" and "least effective learning" occurred for pupils.

The pattern of these data is apparent in Table 8.4. In this table the mean difference, the standard deviation of the mean difference, the slopes and the intercept are presented for each of the top ten classes and the bottom ten classes.

The following features of Table 8.4 should be noted. All of the classes in the top ten have slopes less than 1; whereas all of the classes in the bottom ten except one have slopes equal to or greater than 1. The intercepts of the top ten classes are positive and large; whereas the intercepts of the bottom ten classes are either negative or have a small positive value. The range of the mean differences for the top ten classes is from 16.76 to 41.14; the range of the mean difference for the bottom ten classes is from 1.46 to 20.63. There is only minimal overlap in the distributions of the mean differences.

Table 8.4

Mean Difference, Standard Deviation of the Mean Difference, Slope and Intercept for the Top and Bottom Ten Classes
Grade 2 Reading

Top 10 Classes

T#	$\bar{X}$	df	Mean Diff.	SD_{s-f}	b	c
73	168.13	20	20.30	43.07	.80	53.72
86	145.89	16	20.72	37.72	.60	79.25
09	99.34	22	17.15	36.55	.66	51.37
18	116.48	19	39.64	43.77	.80	62.55
22	212.84	18	16.76	24.55	.70	80.50
31	142.89	23	35.59	31.62	.78	67.64
35	116.15	10	41.14	33.20	.90	52.35
40	159.38	17	20.33	36.75	.69	69.19
45	181.38	21	26.44	27.56	.74	72.97
47	183.07	26	34.36	30.79	.77	77.06

Bottom 10 Classes

T#	$\bar{X}$	df	Mean Diff.	SD_{s-f}	b	c
72	203.22	21	5.61	28.31	1.16	-27.54
77	194.21	18	20.63	26.62	1.10	1.35
89	149.04	18	8.33	26.31	1.15	-14.49
04	162.51	11	15.42	16.93	1.12	- 5.99
07	163.35	18	7.92	22.58	1.00	7.99
08	129.76	22	2.81	31.06	.91	14.82
11	141.96	10	2.13	35.80	1.21	-31.63
42	140.78	17	13.60	36.82	1.20	-14.70
50	174.58	11	1.46	35.55	1.03	-16.15
53	125.96	18	16.15	35.57	1.11	2.46

Another way to look at these data is presented in Table 8.5. In this table the classes are paired by selecting a class from the top ten and a class from the bottom ten. The pairs are ordered by the magnitude of the mean of the scores for the fall; for example, T22, selected from the top 10, has the highest mean fall score among the top ten classes. T72, paired with T22, selected from the bottom ten classes, has the highest mean fall score of the bottom ten classes. Each pair is composed by selecting the next highest mean fall score among the top ten and matching it with the next highest mean fall score among the bottom 10.

The mean scores through the first seven pairs are very close in numerical value. Pairs 8, 9, and 10 show numerically large differences between the means of the fall scores. The standard deviation of the fall scores is also presented in this table to show the amount of overlap in the distributions. Thus, although pairs 8, 9, and 10 have mean scores which depart by more than 10-score units from each other, the size of their respective standard deviations is sufficiently large so that it is obvious that the distributions overlap considerably. In pair 8, for example, T18 has a mean of 116.48 and a standard deviation of 55.21; thus +1 and -1 standard deviations include scores from 61.27 to 171.69. +1 and -1 standard deviations around the mean of T42 include scores from 95.25 to 186.31. (The significance of the difference of the means of the last three pairs is not relevant to the point being made here.)

The obvious fact that appears in Table 8.5 is that classes whose mean scores fall in the same initial area show considerable difference in amount of change in score from fall to spring. The one exception to this

Table 8.5

Top and Bottom Classes Paired by Order of Magnitude of Fall Means; Mean Differences and Standard Deviation of Fall Mean for Each Class
Grade 2 Reading

	T#	$\bar{X}_F$	SD_F	Mean Diff.
1.	22 (T)*	212.84	48.71	16.76
	72 (B)	203.22	42.58	5.61
2.	47 (T)	183.07	49.74	34.36
	77 (B)	194.21	33.94	20.63
3.	45 (T)	181.38	46.97	26.44
	50 (B)	174.58	60.28	1.46
4.	73 (T)	168.13	53.40	20.30
	7 (B)	163.35	55.21	7.92
5.	40 (T)	159.38	40.23	20.33
	4 (B)	162.51	53.47	15.42
6.	86 (T)	145.89	42.86	20.72
	89 (B)	149.04	42.08	8.33
7.	31 (T)	142.89	58.51	35.59
	11 (B)	141.96	26.60	2.13
8.	18 (T)	116.48	55.21	39.64
	42 (B)	140.78	45.53	13.60
9.	35 (T)	116.15	37.24	41.14
	8 (B)	129.76	39.08	2.81
10.	9 (T)	99.34	55.21	17.15
	53 (B)	125.96	42.01	16.15

*T = top ten

B = bottom ten

general statement may be the 10th pair, T9 and T53, where the largest difference in means occurs and where the mean differences are approximately equal. In general, however, the pairs are sufficiently close in initial scores to justify the statement that the classes' performance on the final testing is substantially different.

The purpose of this analysis was to demonstrate that there is sufficient range in the patterns of differences across the classes to be optimistic that these differences may be associated with the instructional context including teaching performances. That teaching performances may be related to these differences remains to be shown. Before considering the relationship of teaching performances to differences in scores between fall and spring of the kinds illustrated here, plausible rival hypotheses to account for these differences should be eliminated (e.g., that pupil aptitude accounts for differences more than do other variables). These rival hypotheses will be considered in the next major section which follows the analysis of scores in mathematics at Grade 2 and of scores in reading and mathematics at Grade 5.

Analysis of Mathematics: Grade 2

This section presents an analysis for mathematics scores at Grade 2 similar to that presented in the preceding section on reading. Again, the data presented are those obtained by performing regression analyses on the scores of students taught by a particular teacher. Fall and spring total scores in mathematics are the scores used in these analyses.

Table 8.1 presents the correlation coefficient (r), slope (b), intercept (c), standard error of estimate of the correlation coefficient and the probability (p) of the F-values for the goodness-of-fit of the line for each class. Again note that all but one of the F-values are significant. The r's range from .06 to .92; b's, from .06 to 1.44; and the intercepts, from -50.51 to 163.87.

The values of r again are concentrated in the same intervals as were the r's for reading.

Distribution of r's for Grade 2 Mathematics

r	f
.90 -	3
.80 - .89	13
.70 - .79	11
.60 - .69	5
.50 - .59	4
.40 - .49	0
Below .40	1
	37

Table 8.6 presents the distribution of r by c and r by b. Notice the tendency in the distribution of r by c for low coefficients to be associated with large positive intercepts. Note also in the distribution of r by b the tendency of low r's to be associated with low b's. But as we pointed out in the previous section the most interesting relationship is that of b to c.

Table 8.6

Frequency Distribution of the Correlation Coefficient (r) by the Intercept (c);
Frequency Distribution of the Correlation Coefficient (r) by Slope (b);
Regression Analysis Data for Each Teacher-Group In Grade 2 Mathematics - N = 37

	c							
r	Below -40.0	-39 to 0	1-19	20-49	50-69	70-89	90-109	109 -
.90 -				2	1			
.80 - .89	1	1	2	6	3			
.70 - .79			2		7	2		
.60 - .69	1				2	1	1	
.50 - .59						2	1	1
140 - .49								
Below .40								1
N	2	1	4	8	13	5	2	2

	b							
r	.00-.19	.20-.39	.40-.59	.60-.79	.80-.99	1.00-1.19	1.20-1.39	1.40 -
.90 -					2	1		
.80 - .89					8	3	1	1
.70 - .79				6	4	1		
.60 - .69			2	1	1		1	
.50 - .59			3	1				
.40 - .49								
Below .40	1							
N	1	0	5	8	15	5	2	1

Figure 8.7 is analogous to Figure 8.1 in which the lines with the largest and smallest slopes and largest and smallest intercepts are plotted around the regression line for the entire group. Again the group with the smallest slope also has the largest intercept, T83 (b = .06, c = 163.87). In this case the line with the largest slope also has the second smallest intercept, T21 (b = 1.44, c = -44.57). It should also be noted that for the group-as-a-whole there is a high positive correlation, r = .80, between the spring and fall scores and the intercept indicates a relatively large positive change.[8] As is apparent, the slopes of the regression lines for the individual classes are not parallel to the slope of the regression line for the entire group. See also Figure 8.7a.

Figure 8.8 presents the plot of b against c, using the b and c-values for each group. The extreme deviations are noteworthy in this array. The top and bottom ten classes were selected in the manner previously described.

Table 8.7 presents the fall and spring means, standard deviations and ranges for each class, the mean difference between fall and spring scores and the standard deviation of the mean differences. Table 8.8 presents the fall mean, mean difference, the standard deviation of the mean difference, the slope and intercept for each of the classes in the top and bottom ten classes. The slopes (b) for the top ten classes range from .06 to .73;

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[8] In comments of this kind, we are comparing the absolute values of the intercepts to each other. We have not translated these intercept-values into grade equivalent scores for obvious reasons. Note the location of T in each of the figures of the plot of b against c (Figure 8.8). T is the point marking the b and c values for the entire group.

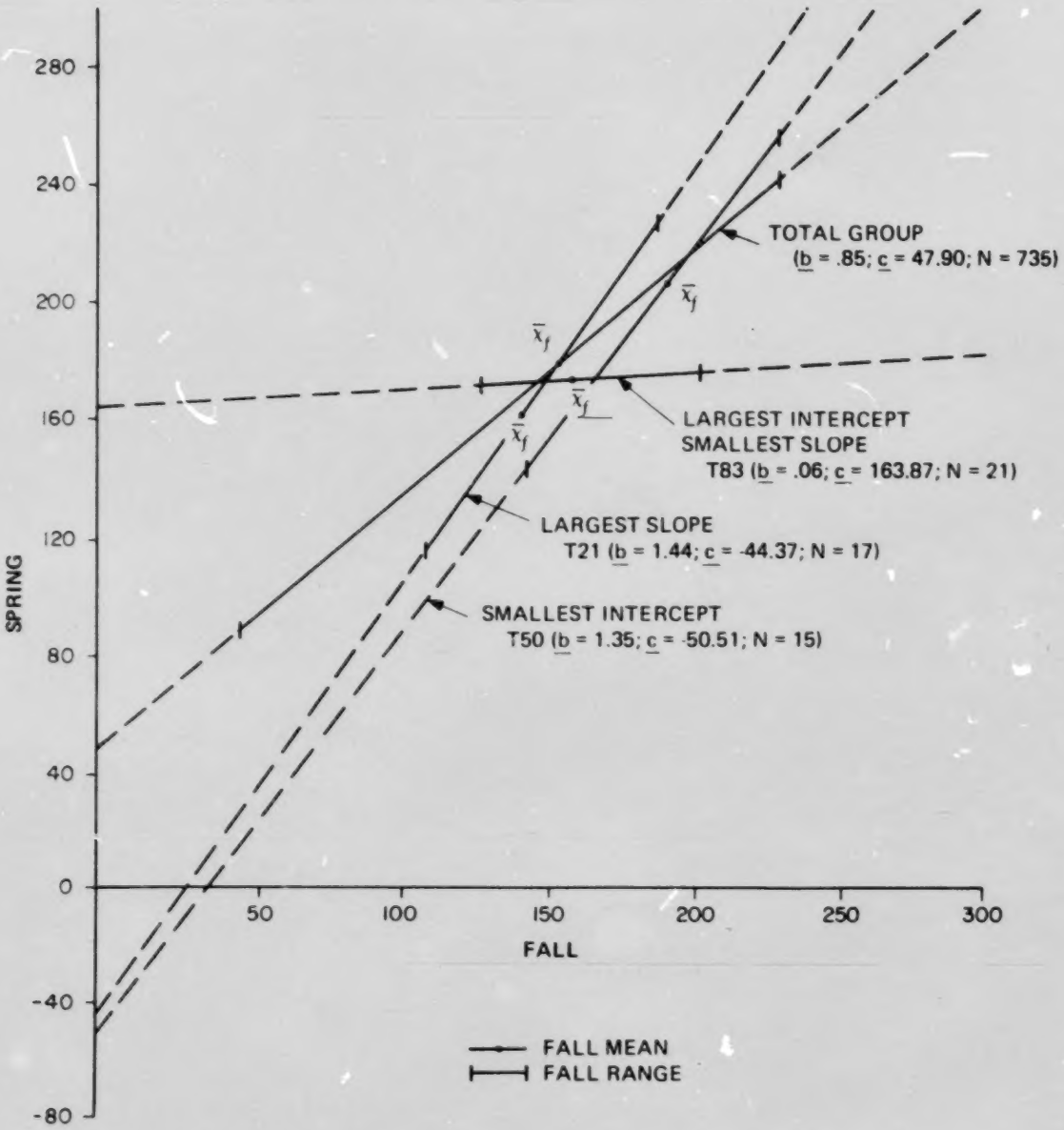
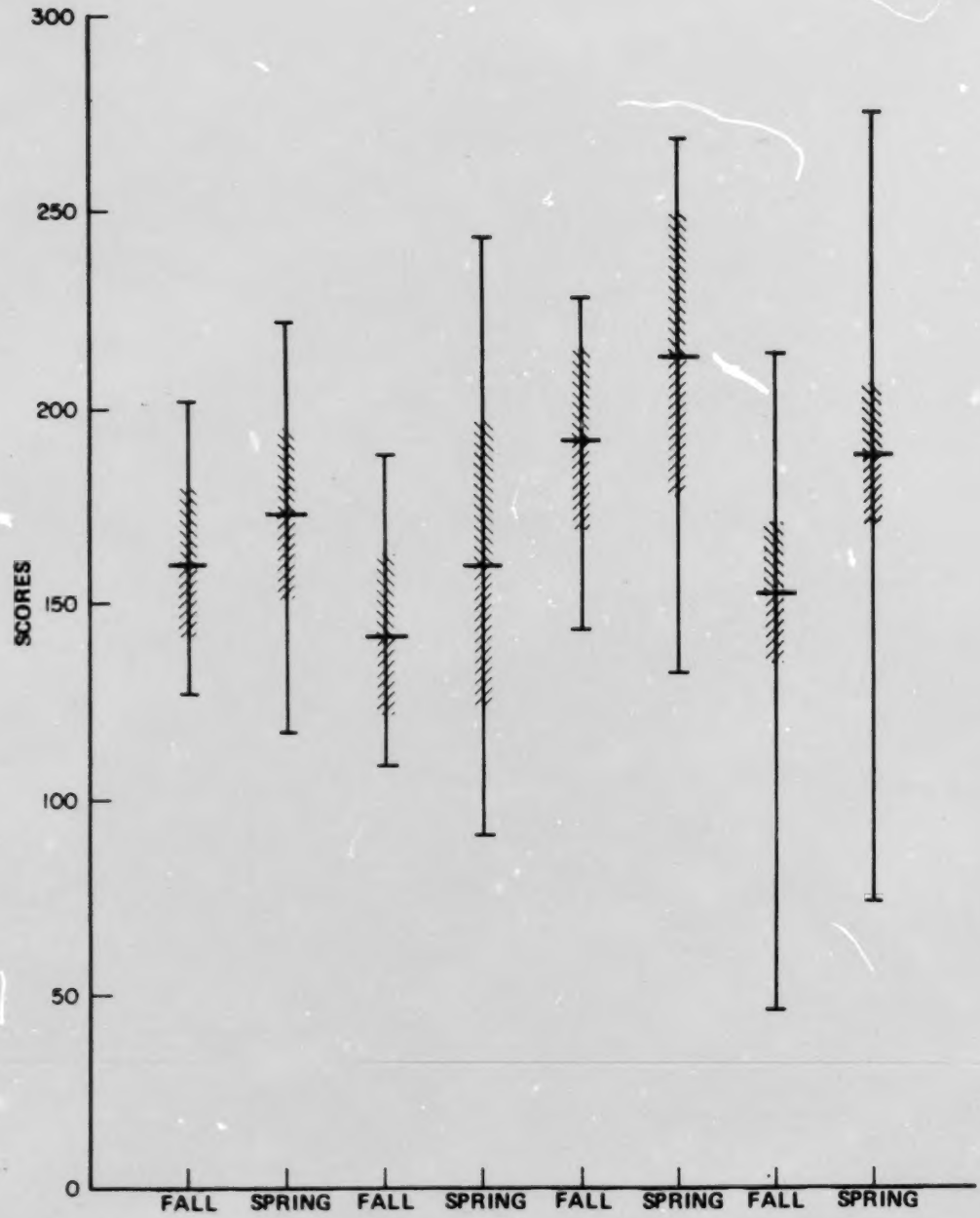


Figure 8.7. Regression Lines for Selected and Total Group: Grade 2 Mathematics



T83	T21	T50	TOTAL GROUP
$\bar{X}_f$ = 159.37	$\bar{X}_f$ = 141.21	$\bar{X}_f$ = 191.53	$\bar{X}_f$ = 152.50
SD_f = 19	SD_f = 21	SD_f = 23	SD_f = 18
R_f = 127.28 – 201.99	R_f = 108.84 – 188.00	R_f = 143.28 – 228.20	R_f = 46.24 – 228.20
$\bar{X}_s$ = 172.73	$\bar{X}_s$ = 159.45	$\bar{X}_s$ = 212.72	$\bar{X}_s$ = 177.74
SD_s = 22	SD_s = 37	SD_s = 36	SD_s = 18
R_s = 116.41 – 221.97	R_s = 91.48 – 243.59	R_s = 132.24 – 268.14	R_s = 74.19 – 275.29

Figure 8.7a. Fall and Spring Means, Standard Deviations and Ranges for Selected Classes and Total Group: Grade 2 Mathematics

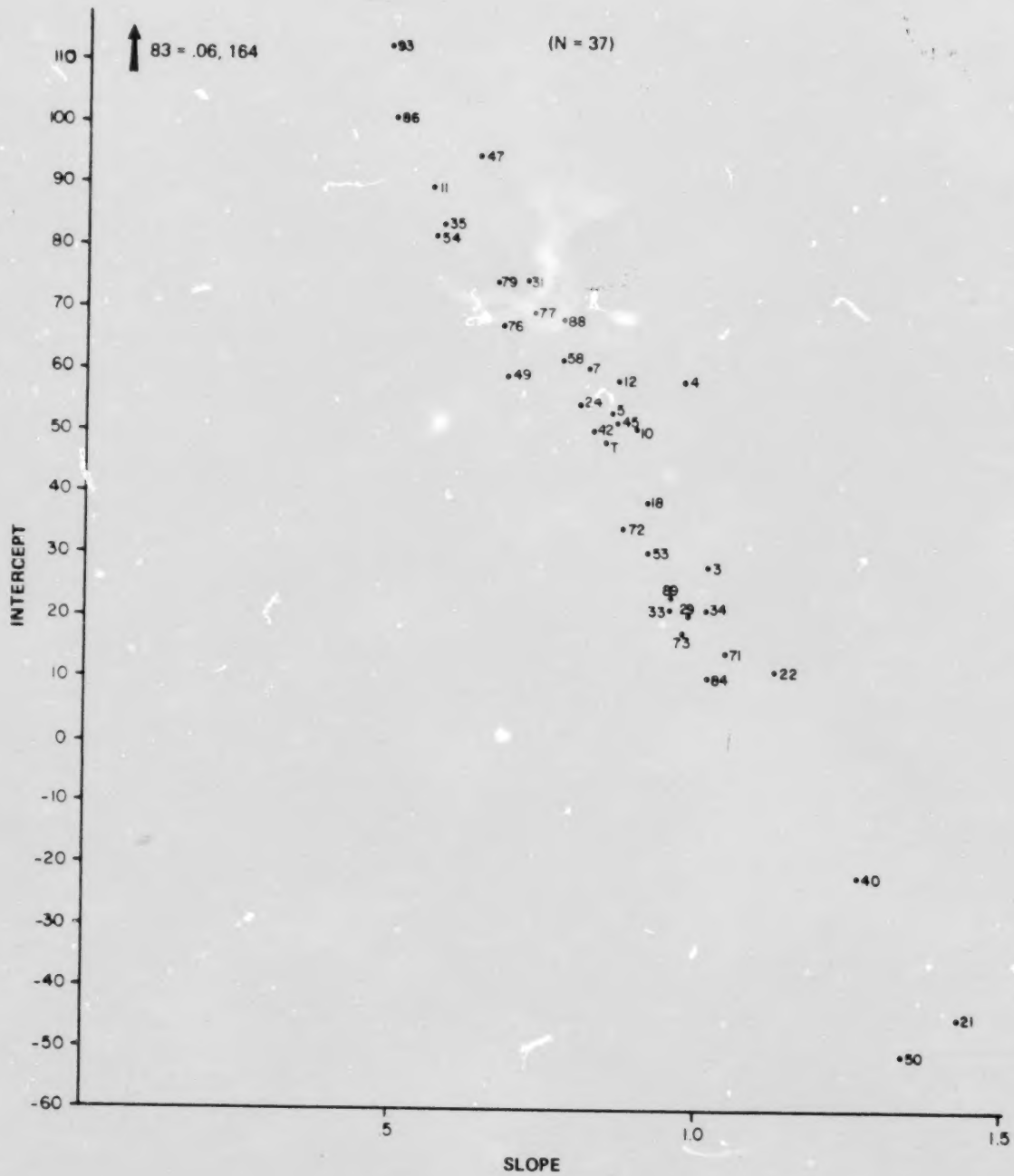


Figure 8.8. Plot of the Slope (b) and Intercept (c) – Values for Each Teacher

Table 8.7

Fall and Spring Means, Standard Deviations, Ranges, Mean Difference and Standard Deviation of the Mean Difference for Each Teacher-Pupil Group for Grade 2 Mathematics - N = 38

T#	$\bar{X}_f$	SD_f	R_f	$\bar{X}_s$	SD_s	R_s	Mean Diff.	SD_{s-f}
03	146.42	34.21	100.37 - 210.86	177.51	38.92	109.24 - 247.68	31.10	17.39
04	143.97	36.69	76.39 - 204.99	194.50	40.31	120.33 - 260.96	50.54	23.39
05	109.41	41.99	62.94 - 205.97	146.24	42.07	74.19 - 254.98	36.83	22.65
07	147.29	38.93	53.05 - 217.75	180.64	38.74	112.71 - 262.59	33.35	23.13
10	150.36	31.61	98.52 - 222.64	186.22	31.75	127.04 - 253.38	35.87	14.14
11	149.52	24.61	102.33 - 188.32	173.36	24.52	122.38 - 217.07	23.84	22.91
12	164.43	25.75	119.63 - 212.20	201.61	30.56	158.79 - 262.55	37.17	20.99
13	154.39	17.15	118.99 - 178.66	171.71	18.10	134.87 - 189.41	17.32	13.30
18	139.79	27.22	91.81 - 198.98	166.18	31.02	101.64 - 212.60	26.39	18.59
21	141.21	20.92	108.84 - 188.00	159.45	36.89	91.48 - 243.59	18.24	23.11
22	186.49	27.61	112.44 - 227.09	222.36	35.99	146.10 - 275.29	35.87	18.10
24	154.90	13.94	125.78 - 183.48	179.70	18.17	139.00 - 229.53	24.80	14.50
29	149.99	37.11	93.67 - 222.64	168.61	42.92	88.35 - 264.17	18.62	22.31
31	147.13	26.77	80.68 - 194.19	180.53	25.51	133.72 - 222.43	33.38	18.24
33	142.05	25.68	107.85 - 195.53	157.49	30.31	109.40 - 215.29	15.44	17.75
34	133.40	29.09	86.75 - 194.42	157.48	32.39	103.43 - 220.16	24.09	12.71
35	103.70	24.43	46.24 - 140.15	142.98	23.79	96.15 - 185.30	29.29	21.73
40	142.12	18.03	106.17 - 183.31	158.88	28.64	114.97 - 233.18	16.77	17.86
			R			R		
			46.24 - 228.20			74.19 - 275.29		

Table 8.7 (Continued)

T#	$\bar{X}_f$	SD_f	R_f	$\bar{X}_s$	SD_s	R_s	Mean Diff.	SD_{s-f}
42	133.73	33.85	81.29 - 203.00	160.91	38.33	101.98 - 218.58	27.19	26.73
45	167.72	21.23	133.28 - 205.53	197.15	24.27	145.94 - 252.11	29.43	15.90
47	171.66	24.65	126.58 - 221.51	203.62	30.55	139.74 - 268.14	31.96	27.60
49	157.37	22.58	111.01 - 200.14	172.67	24.67	130.35 - 236.73	15.30	16.49
50	191.53	22.82	143.28 - 228.20	212.72	35.77	132.24 - 268.14	21.19	24.53
53	135.06	41.94	68.00 - 206.64	154.26	42.13	90.43 - 220.01	19.19	17.43
54	129.93	28.17	82.59 - 182.41	154.79	23.64	108.61 - 211.64	24.85	21.29
58	160.49	34.19	76.60 - 216.41	186.12	34.17	134.97 - 271.59	25.63	22.68
71	178.95	23.04	141.81 - 211.88	201.13	31.11	129.44 - 245.88	22.19	19.65
72	175.05	29.03	109.74 - 217.75	186.86	31.80	110.99 - 234.45	11.81	19.48
73	171.36	24.52	124.35 - 216.64	185.82	31.63	91.76 - 231.27	14.46	20.44
76	152.83	23.57	121.06 - 211.09	171.06	20.36	141.76 - 219.21	18.22	14.67
77	169.16	28.83	101.97 - 215.97	193.15	27.40	147.10 - 245.24	23.99	19.61
79	172.92	24.33	129.91 - 217.09	190.87	22.38	148.48 - 224.66	17.95	17.14
83	159.37	18.65	127.28 - 201.99	172.73	22.48	116.41 - 221.97	13.36	28.53
84	157.88	34.35	91.50 - 222.20	171.02	40.64	101.68 - 235.77	13.14	20.53
86	156.89	28.49	110.15 - 222.64	178.22	23.41	138.95 - 241.75	21.33	23.37
88	159.45	17.69	129.14 - 189.12	192.77	21.59	154.92 - 224.76	33.22	17.00
89	144.07	32.45	50.19 - 192.31	160.77	35.77	86.58 - 233.82	16.70	17.68
93	143.04	23.20	93.55 - 205.30	182.17	20.72	140.91 - 226.11	39.12	20.88

	$\bar{X}_{mf}$	SD_{mf}	R_{mf}	$\bar{X}_{ms}$	SD_{ms}	R_{ms}
TOTAL GROUP	152.50	18.41	103.70 - 191.53	177.74	18.31	142.98 - 222.36
		$\sigma_{e_{mf}}$			$\sigma_{e_{ms}}$	
		2.99			2.97	

Table 8.8

Mean Difference, Standard Deviation of the Mean Difference, Slope and Intercept for the Top and Bottom Ten Classes, Grade 2 Mathematics

Top 10 Classes

T#	$\bar{X}_t$	df	Mean Diff.	SD_{s-f}	b	c
83	159.37	21	13.36	28.53	.06	163.87
93	143.04	19	39.12	20.88	.49	111.53
86	156.89	16	21.33	23.37	.50	99.57
47	171.66	27	31.96	27.60	.64	93.55
11	149.52	23	23.84	22.91	.56	89.16
35	103.70	20	29.29	21.73	.58	82.99
54	129.93	25	24.85	21.29	.57	81.18
79	172.92	21	17.95	17.14	.67	74.17
31	147.13	24	33.38	18.24	.72	74.29
77	169.16	18	23.99	19.61	.73	69.11

Bottom 10 Classes

T#	$\bar{X}_F$	df	Mean Diff.	SD_{s-f}	b	c
34	133.40	16	24.09	12.71	1.02	20.83
33	142.05	14	15.44	17.75	.96	21.45
29	149.99	18	18.62	22.31	.99	20.40
73	171.36	20	14.46	20.44	.98	17.16
71	178.95	20	22.19	19.65	1.05	13.61
84	157.88	17	13.14	20.53	1.02	9.74
22	186.49	25	35.87	18.10	1.13	10.70
40	142.12	20	16.77	17.86	1.27	-21.71
21	141.21	17	18.24	23.11	1.44	-44.57
50	191.53	15	21.19	24.53	1.35	-50.51

whereas the slopes for the bottom ten classes are close to 1 or larger -- from .96 to 1.44. There is also no overlap in the distribution of the intercepts; the lowest of the intercepts in the top ten classes, T77, $\underline{c}$ = 69.11, is almost 50 score points above the largest of the intercepts in the bottom ten classes, T33, $\underline{c}$ = 21.45.

Here again we see the same pattern as we saw in the distribution of slopes ($\underline{b}$) by intercepts ($\underline{c}$) for Grade 2 Reading: A top group composed of classes which have slopes less than 1 and substantial positive intercepts; and, a bottom group where the slopes are equal to or greater than 1 and the intercepts are either positive and small or negative.

Table 8.9 presents the top and bottom classes paired beginning with the two having the highest fall mean scores. In four of the pairs, pairs 5, 6, 7 and 8, where the fall means were close to each other, the class in the top ten made considerably greater positive changes over the year; in two pairs, 3 and 4, where the means were about ten points apart, the classes made comparable changes; in all other pairs the fall mean of the class in the top pair fell 12 or more points below the mean of its pair from the bottom ten classes. In two of these cases the differences in the top classes exceeded those of the bottom classes (9, 10), and in two cases differences in the top class were about four points less than those of the bottom class (1, 2).

The reader should remember in considering these comparisons of differences from fall to spring that in this study it is not the mean difference that determines whether or not a class falls in the top ten or

Table 8.9

Top and Bottom Classes Paired by Order of Magnitude of Fall Means; Mean Difference and Standard Deviation of Fall Mean for Each Class
Grade 2 Mathematics

	T#	$\bar{X}_f$	SD_f	Mean Diff.
1.	79 (T)	172.92	24.33	17.95
	50 (B)	191.53	22.82	21.19
2.	47 (T)	171.66	24.65	31.96
	22 (B)	186.49	27.61	35.87
3.	77 (T)	169.16	28.83	23.99
	71 (B)	178.95	23.04	22.19
4.	83 (T)	159.37	18.65	13.36
	73 (B)	171.36	24.52	14.46
5.	86 (T)	156.89	28.49	21.33
	84 (B)	157.88	34.35	13.14
6.	11 (T)	149.52	24.61	23.84
	29 (B)	149.99	37.11	18.62
7.	31 (T)	147.13	26.77	33.38
	21 (B)	141.21	20.92	18.24
8.	93 (T)	143.04	23.20	39.12
	40 (B)	142.12	18.03	16.77
9.	54 (T)	129.93	28.17	24.85
	33 (B)	142.05	25.68	15.44
10.	35 (T)	103.70	24.43	29.29
	34 (B)	133.40	29.09	24.09

bottom ten. It is a combination of the slope and the intercept that determines the rank of the classes in the top and bottom groups. T79, for example, has a slope of .67 and an intercept of 74.17; whereas its pair, T50, has a slope of 1.35 and an intercept of -50.51. It is obvious that the two classes are performing quite differently, when all of these data are considered.

A common belief is that the variance of initial scores is a factor that will be related to both the amount and rate of change in a class. The reason for this belief is that the teacher has a narrower range of students' performance with which he or she must cope. The teacher does not have to diversify teaching methods and materials as much as he or she would have to do in a class where the spread of initial performance is large. The teacher has more time for an intensive instructional effort.

Although this argument is persuasive, the data may not support it. If the fall variance of a group is smaller than that of other groups, and if the above argument reflects how teachers actually teach, we would expect the spring variance to be equal to or less than the fall variance, and the mean difference to be substantial. Conversely, if the fall variance is larger than that of other classes, we would expect the spring variance to be equal to or larger than the fall variance, and the mean difference to be smaller. The cases discussed next illustrate some problems with this reasoning.

T88 and T24 have the two smallest variances for fall scores (T88: $SD_f = 17.69$; T24: $SD_f = 13.94$). Their slopes are less than 1 and intercepts are positive; both fall near the upper end of the middle group in the $\underline{b}$ by $\underline{c}$ distribution. T53 and T05 have the largest variances in the fall (T53: $SD_f = 41.94$; T05: $SD_f = 41.99$). Their slopes are nearer 1 (T53: $\underline{b} = .92$; T05; $\underline{b} = .86$). Their intercepts fall in the middle range (T53: $\underline{c} = 30.23$; T05: $\underline{c} = 52.54$). Thus, all four classes are performing similarly even though their variances differed considerably at the initial testing. The fall variance of a class is not a good predictor of how it will have changed by spring.

Consider the class with the highest mean in the fall, T50 ($\bar{X}_f = 191.53$) and the class with the lowest initial mean, T35 ($\bar{X}_f = 103.70$). The variances of the distribution of the fall scores for these two classes are approximately equal. The mean gain for T50 is 21.19 and for T35 is 29.29. The slopes differ considerably ($\underline{b} = 1.25$ and $\underline{b} = .58$) as do the intercepts ($\underline{c} = -50.51$ and $\underline{c} = 82.99$). The initial position of a class is obviously not a reliable indicator of its later performance.

These selected comparisons have been made to sensitize the reader to using the slope and intercept together as the indicator of the comparative performances of classes. We have stressed that this indicator is but <u>one</u> indicator of differences in effective learning experiences. What is obvious in these data is that not all students are making gains proportional to what might be expected from their initial positions. This fact is of significance in estimating the effects of teaching performances.

In Figure 8.9, the graphs of the top and bottom five classes are plotted against the reference graph with the fall ranges indicated. In T83 the students at the lower end have made the greatest gains, whereas, some at the upper end may have scored lower in the spring than in the fall. This pattern also appears in T93, T86 and T47. Recall that the regression line is the line of predicted values (Y') for spring scores. Since this line "fits" the array of actual scores, some actual scores fall below this line which means that the class did less well than predicted on the basis of their fall scores. This happened because the increase in spring scores over fall scores was not as large proportionately as would be expected for higher fall scores or because some spring scores were lower than fall scores.

For T50, T21 and T40 gains occur at the higher end of the range. A case could be made that T50's gains are better than T83's since those at the lower end are about where they began or have moved up. But T50's initial mean was higher. Though the two classes are still apart in mean scores in the spring (T83: $\bar{X}_s = 172.73$; T50: $\bar{X}_s = 212.72$), the variances differ (T83: $SD_s = 22.46$; T50: $SD_s = 35.77$). Apparently in T83, the pupils whose scores were at the lower end made greater gains but the variance remained about the same; whereas for T50, the higher end made greater gains and the variance increased.

Although the contrasts between the top and bottom five classes are different in mathematics than in reading, they follow the same general pattern. The top five are a group where the lower end of the scores shows substantial gains over the year. In mathematics, however, the gains in scores of pupils at the upper end are not as great as the corresponding group in reading (see Figure 8.6). But the analysis of teaching performance differences across these groups should favor finding a greater range of effective teaching performances.

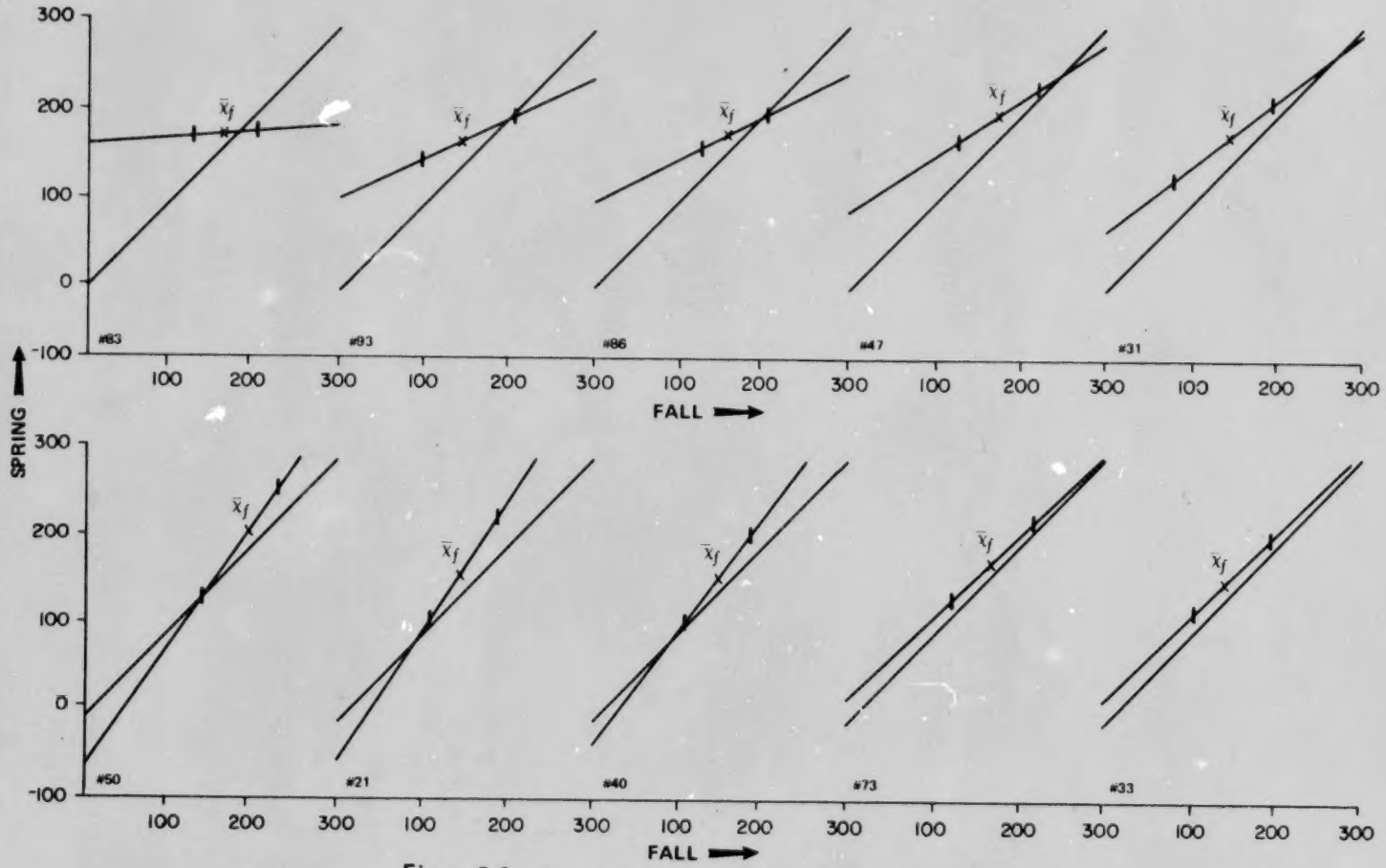


Figure 8.9. Regression Lines of Top and Bottom Five Classes Plotted Against Reference Graph ($\underline{b} = 1$, $\underline{c} = 0$). Grade 2 Mathematics

Comparison of Top and Bottom Classes
in Reading and Mathematics - Grade 2

The classes of teachers who taught both reading and mathematics were sorted into a contingency table locating whether they fell in the top or bottom ten or middle group for both reading and mathematics. Table 8.10 presents this contingency table. In the upper half of Table 8.10 the classes are listed by number; in the lower half the frequencies are listed in the cells of the contingency table.

There are some reversals; for example, T73, T22 and T40 which fell in the top group in reading, fell in the bottom group in mathematics. One class, T50, fell at the bottom of both distributions. The contingency table containing the frequencies suggests that there is not a systematic pattern across this array. (Note that N = 31 because only the classes of teachers who taught both reading and mathematics are included in this contingency table.) The Chi-square value for this table is 3.66 which is not significant. The location of a teacher's group in reading does not predict the location of the teacher's mathematics group. Nor are teachers providing comparably effective learning experiences in reading and mathematics.

The reader is aware that there were some regroupings of students and that pupils taught reading in a class are not necessarily the same pupils taught mathematics. Since the teachers may have been grouping students who were similar, class composition is not likely to have changed markedly as classes were recomposed. Consider T50, for example. T50 fell in the bottom ten classes in both reading and mathematics. The range of scores

Table 8.10

Distribution of Classes by Location of Scores in Reading and Mathematics in Top and Bottom 10 or Middle; Grade 2[1]

Mathematics

Reading	Top	Middle	Bottom
Top	86, 31, 35, 47	88, 18, 45	73, 22, 40
Middle	83, 93, 54, 79	03, 05, 24, 58, 76, 88	71, 21, 29
Bottom	77, 11	89, 72, 4, 7, 42, 53	50

Mathematics

Reading	Top	Middle	Bottom	
Top	4	2	3	9
Middle	4	6	3	13
Bottom	2	6	1	9
	10	14	7	31

READING ONLY 08**, 09*

MATHEMATICS ONLY 84**, 10, 12, 33**, 34**, 49

$\chi^2 = 3.6638$
df = 4
n.s.

*Top Ten

**Bottom Ten

[1]Note that $N_T \neq 33$ or 37 because all teachers did not have both mathematics and reading classes.

for reading in the fall was 37.51 - 257.73 and the range in mathematics in the fall was from 143.28 - 228.20. Also T50's fall mean fell in the third highest pair in reading and the first highest pair in mathematics; the mean differences in reading and mathematics were 1.46 and 21.19 respectively. T50 is a class where when gains occur, they occur mainly for pupils at the higher end of the range.

Consider the reversals, that is, teachers who were in the top ten classes in reading and were in the bottom 10 in mathematics. The range of fall scores in reading for T73 was 95.02 - 257.73, and the range for mathematics in the fall was 124.35 - 216.64. If these two groups are composed of different students, T73 had a class in mathematics the variance of whose initial scores was smaller than the variance of his or her classes' reading scores. That statement is also true for T22 and T40. If the more homogeneous classes are "easier" to teach, then these classes should have shown greater positive change. But the teachers appear in the top ten when their classes had larger variances in the fall. Apparently the initial range is not the critical factor in determining how much the pupils learn.

Consider the cases where the class was in the top ten in mathematics and in the bottom ten in reading, T77 and T11 being the two instances of this reversal. In T77 the range in reading in the fall was 114.85 - 246.62, and in mathematics was 101.97 - 215.97, the variance being somewhat larger in reading than in mathematics. For T11 the range in reading in the fall was 99.10 - 206.03, and in mathematics was 102.33 - 188.32, the variance of these two distributions being almost equal. These data suggest that the teachers are not teaching markedly different kinds of students. We

know from the data that in many instances the classes were identical;[9] but the performances of the classes differ over the year.

Analysis of Reading - Grade 5

Analyses identical to those described above were performed on the fifth-grade reading and mathematics data. In this section we consider the results of these analyses for reading.

Table 8.11 presents the correlation coefficient (r), the slope (b) and intercept (c), the standard error of estimate and the probability of the F-value for R^2 (or the goodness-of-fit of the regression line). As can be seen, again there is a range in the values of r, b and c, and all four r's are statistically significant.[10] The distribution of r is presented below; note that 25 of these values fall in the range, .70 - .89.

Distribution of r's; Grade 5 Reading

r	f
.90	4
.80 - .89	19
.70 - .79	6
.60 - .69	4
.50 - .59	4
.40 - .49	3
Below .40	2
	42

Table 8.12 presents the distribution of r by c and r by b. Again, no systematic pattern can be found except a tendency for smaller slopes to be associated with smaller r's and larger intercepts to be associated with smaller r's.

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[9] The N for the reading group and the mathematics group may differ slightly because a student was missing on a testing day.

[10] When non-significant r's occur, the b < 1.00 and c is positive and usually large. This fact will lead us to consider b and c values rather than r-values.

Table 8.11

Results of the Regression of Spring Total Scores on Fall Total Scores: Correlation Coefficient (r), Slope (b), Intercept (c), Standard Error of Correlation ($\sigma^2_{y.x}$) Coefficient and the Probability of the F-Value for the Regression for Each Group and Total Group in Reading and in Mathematics; Grade 5 (N_{T_R} = 42; N_{T_M} = 45)[1]

T#	TOTAL READING						TOTAL MATHEMATICS					
	r	b	c	df[1]	$\sigma^2_{y.x}$	p	r	b	c	df[1]	$\sigma^2_{y.x}$	p
06	.81	1.06	- 12.09	31	34.51	.0000	.90	1.26	-47.30	31	26.00	.0000
14	---	---	---	--	---	---	---	---	---	--	---	---
15	---	---	---	--	---	---	.79	.81	21.83	10	13.51	.0066
16	.69	.67	81.89	12	19.54	.0131	---	---	---	--	---	---
17	---	---	---	--	---	---	.56	.80	14.17	11	36.34	.0720
19	.64	1.23	- 45.51	13	30.96	.0194	.73	.92	16.50	24	26.69	.0000
20	.69	.87	5.45	29	36.65	.0000	.92	1.12	-16.17	30	16.45	.0000
23	.89	.90	14.68	24	24.69	.0000	.90	1.09	- 6.98	25	19.85	.0000
25	.75	.89	15.36	26	34.80	.0000	.87	.89	13.17	26	19.90	.0000
26	---	---	---	--	---	---	.81	.74	35.74	29	21.15	.0000
27	---	---	---	--	---	---	---	---	---	--	---	---
28	---	---	---	--	---	---	---	---	---	--	---	---
30	.80	.86	47.26	21	33.46	.0000	.93	1.04	3.03	21	21.02	.0000
32	.85	.94	19.23	17	26.00	.0000	.88	.74	37.68	23	14.40	.0000
36	.49	.62	72.96	11	37.67	.1274	.64	.82	37.05	26	26.27	.0004
37	---	---	---	--	---	---	.88	.91	24.61	25	23.55	.0000
38	.84	.75	26.87	17	19.38	.0000	.92	1.04	- 4.42	21	17.09	.0000
39	.79	.92	- 7.12	23	31.04	.0000	.87	.83	22.64	22	16.41	.0000
41	.80	.88	30.46	27	26.32	.0000	.78	.99	5.66	27	21.78	.0000
43	.57	.74	55.97	22	32.00	.0058	.79	.72	66.45	23	13.81	.0000

Table 8.11 (Continued)

T#	TOTAL READING r	b	c	df[1]	$\sigma^2_{y.x}$	p	TOTAL MATHEMATICS r	b	c	df[1]	$\sigma^2_{y.x}$	p
44	.04	.06	235.49	10	29.69	.9132	---	---	---	--	---	---
46	.83	.98	9.87	27	29.00	.0000	.75	.99	28.70	12	27.74	.0048
48	.85	1.05	- 23.65	26	29.98	.0000	.75	.99	.07	25	31.88	.0000
51	.91	1.26	- 52.79	17	25.45	.0000	.87	1.02	.27	22	27.03	.0000
52	.87	.85	30.34	15	31.11	.0000	.94	1.00	8.88	15	17.97	.0000
55	.47	.58	61.73	25	34.72	.0190	.81	.98	9.02	26	22.07	.0000
56	.79	1.14	- 40.92	29	35.49	.0000	.89	.99	-11.28	29	20.41	.0000
57	.89	1.06	- 13.97	13	31.25	.0001	---	---	---	—	---	---
59	.68	.93	19.29	21	43.58	.0007	.86	1.01	5.66	21	23.05	.0000
60	.40	.50	56.29	12	27.37	.1944	.74	.94	5.88	23	25.05	.0001
61	---	---	---	--	---	---	.68	.72	22.74	22	23.33	.0005
63	.56	.86	16.05	10	34.89	.0957	.85	.87	10.41	21	16.61	.0000
64	---	---	---	--	---	---	.78	.91	12.53	17	26.42	.0002
65	.57	.46	121.11	21	30.93	.0064	.72	.67	56.89	25	19.05	.0001
66	.39	.67	63.30	25	36.48	.0532	.54	.55	73.99	16	25.34	.0293
67	.87	.93	- 7.16	19	26.04	.0000	.90	1.11	-10.27	19	22.48	.0000
68	.88	1.01	- 10.44	21	24.73	.0000	.80	.81	30.81	21	24.46	.0000
69	.81	.84	28.08	28	26.88	.0000	.80	.97	7.10	28	22.51	.0000
70	.71	.78	22.89	23	25.19	.0001	.68	.76	36.78	22	16.04	.0005

Table 8.11 (Continued)

	TOTAL READING						TOTAL MATHEMATICS					
T#	r	b	c	df[1]	$\sigma^2_{y.x}$	p	r	b	c	df[1]	$\sigma^2_{y.x}$	p
74	.76	1.07	- 12.81	23	36.59	.0000	---	---	---	--	---	---
75	.81	.78	50.00	24	25.33	.0000	---	---	---	--	---	---
78	.59	.43	143.74	13	17.10	.0355	.69	.91	27.31	24	23.04	.0002
80	.90	1.09	- 20.00	22	27.32	.0000	.85	.91	26.60	22	22.21	.0000
81	.94	1.04	- 14.81	22	21.86	.0000	.93	.86	26.12	22	19.45	.0000
82	.85	.92	- 8.92	28	27.45	.0000	.78	1.18	-34.89	28	28.65	.0000
85	.94	1.10	- 19.16	15	18.60	.0000	---	---	---	--	---	---
87	---	---	---	--	---	---	.78	.93	- 8.72	23	25.41	.0000
90	.81	.94	1.98	28	24.26	.0000	.68	.88	23.03	28	24.23	.0001
91	.76	.76	42.37	23	27.31	.0000	.83	.90	19.23	23	22.71	.0000
92	.83	1.06	- 25.43	26	32.67	.0000	.93	1.13	-25.02	26	18.22	.0000
94	.84	1.00	- 24.36	26	30.69	.0000	.88	.95	2.46	26	20.36	.0000
95	---	---	---	--	---	---	.86	.98	10.12	16	19.64	.0000
96	---	---	---	--	---	---	.83	.79	40.02	19	17.61	.0000
97	.84	.92	6.82	24	32.53	.0000	.87	1.03	5.41	24	22.55	.0000
TOTAL GROUP	.83	.95	4.99	934	31.35	.0000	.86	.97	5.81	1065	23.31	.0000

[1] T indicates the number of a teacher in this analysis. df = the number of students taught by a teacher.

Table 8.12

Frequency Distribution of Correlations (r) by Intercept (c); Frequency Distribution of Correlations (r) by Slope (b); r, b, and c Derived from Regression Analyses by Teacher; Grade 5 Reading N = 42

c

r	-59 to -40	-39 to -20	-19 to 0	1-19	20-39	40-69	70-99	100-119	120-139	140-159	Over 159
.90 -	1	1	2								
.80 - .89		3	5	5	4	2					
.70 - .79	1		2	1	1	1					
.60 - .69	1			2			1				
.50 - .59				1		1			1	1	
.40 - .49						2	1				
Below .40						1					1
N	3	4	9	9	5	7	2	0	1	1	1

b

r	.00-.19	.20-.39	.40-.69	.70-.89	.90-1.19	1.20-1.39
.90 -					3	1
.80 - .89				6	13	
.70 - .79				4	2	
.60 - .69			1	1	1	1
.50 - .59			2	2		
.40 - .49			3			
Below .40	1		1			
N	1	0	7	13	19	2

In Figure 8.10, regression lines for classes with large and small slopes and large and small intercepts are again plotted. Figure 8.11 presents the plot of b against c. The same pattern apparent in Grade 2 is also apparent in these data.

Table 8.13 presents the fall and spring means, their standard deviations and ranges, the mean difference and the standard deviation of the mean difference for each class. Table 8.14 organizes the data by a group of the top ten and a group of the bottom ten classes, presenting the fall mean, the mean difference, the standard deviation of the mean difference and the slope and intercept for each class in each group. Note that all classes in the top ten have slopes less than 1, and all classes in the bottom ten have slopes greater than 1. Also all intercepts of classes in the bottom ten are negative.

In Table 8.15 the classes are grouped in pairs beginning with the pair that has the highest fall mean. When grouped in this manner, the class from the top ten in the first five pairs has the higher initial mean and a lower variance. In the last five pairs, the class in the top ten has a lower mean than the corresponding class in the bottom ten and with one exception (Pair 7) the variance of the class in the top ten is smaller than the variance of the class in the bottom ten.

Figure 8.12 clarifies what is occurring in these data. Figure 8.12 plots the regression lines of each of the top five and bottom five classes against the reference graph ($b = 1$, $c = 0$). In each of these pairs the class in the upper five has made greater gains at the lower end of the scale. The regression line of the classes in the lower five in these pairs falls

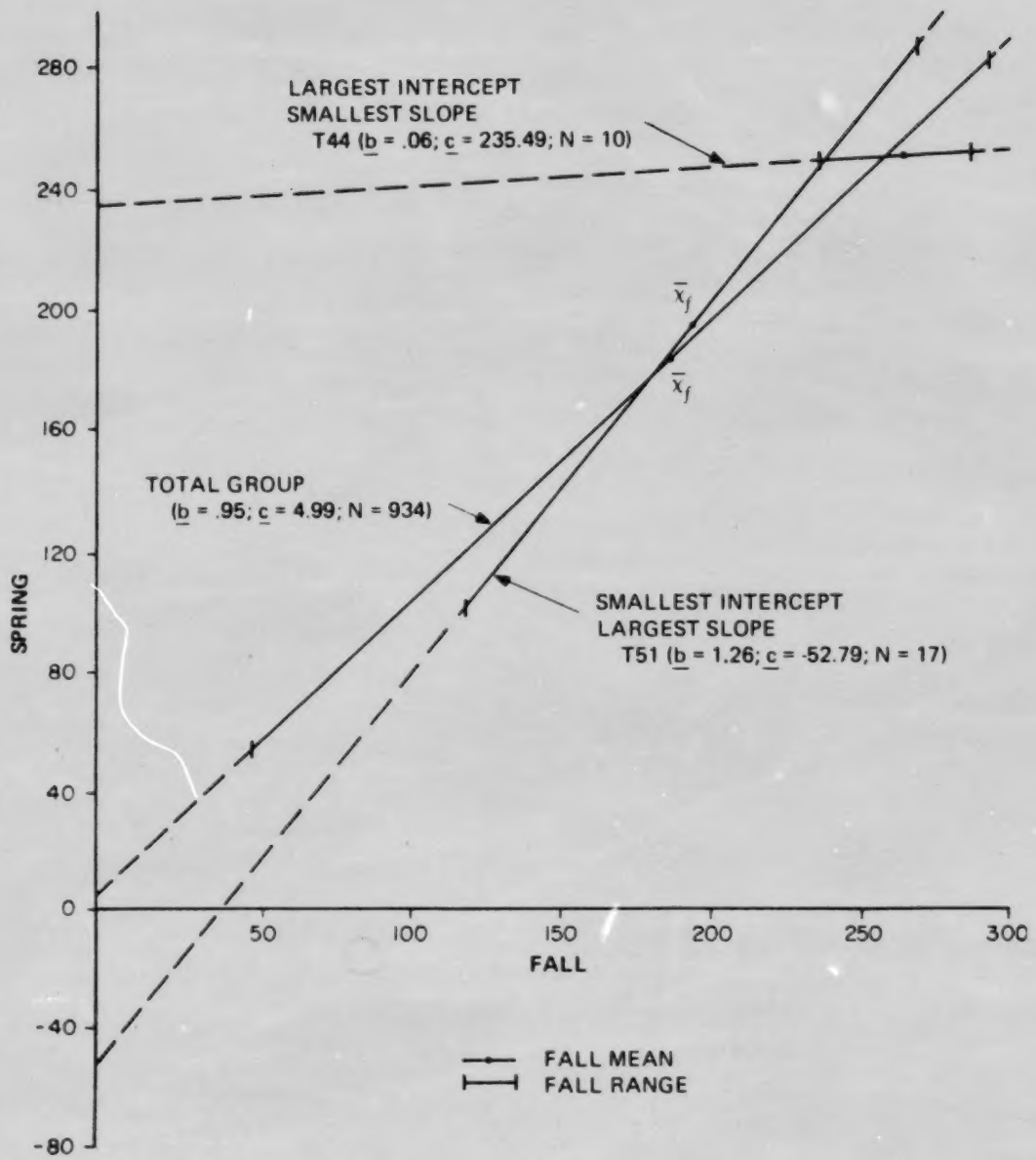


Figure 8.10. Regression Lines for Selected Classes and Total Group: Grade 5 Reading

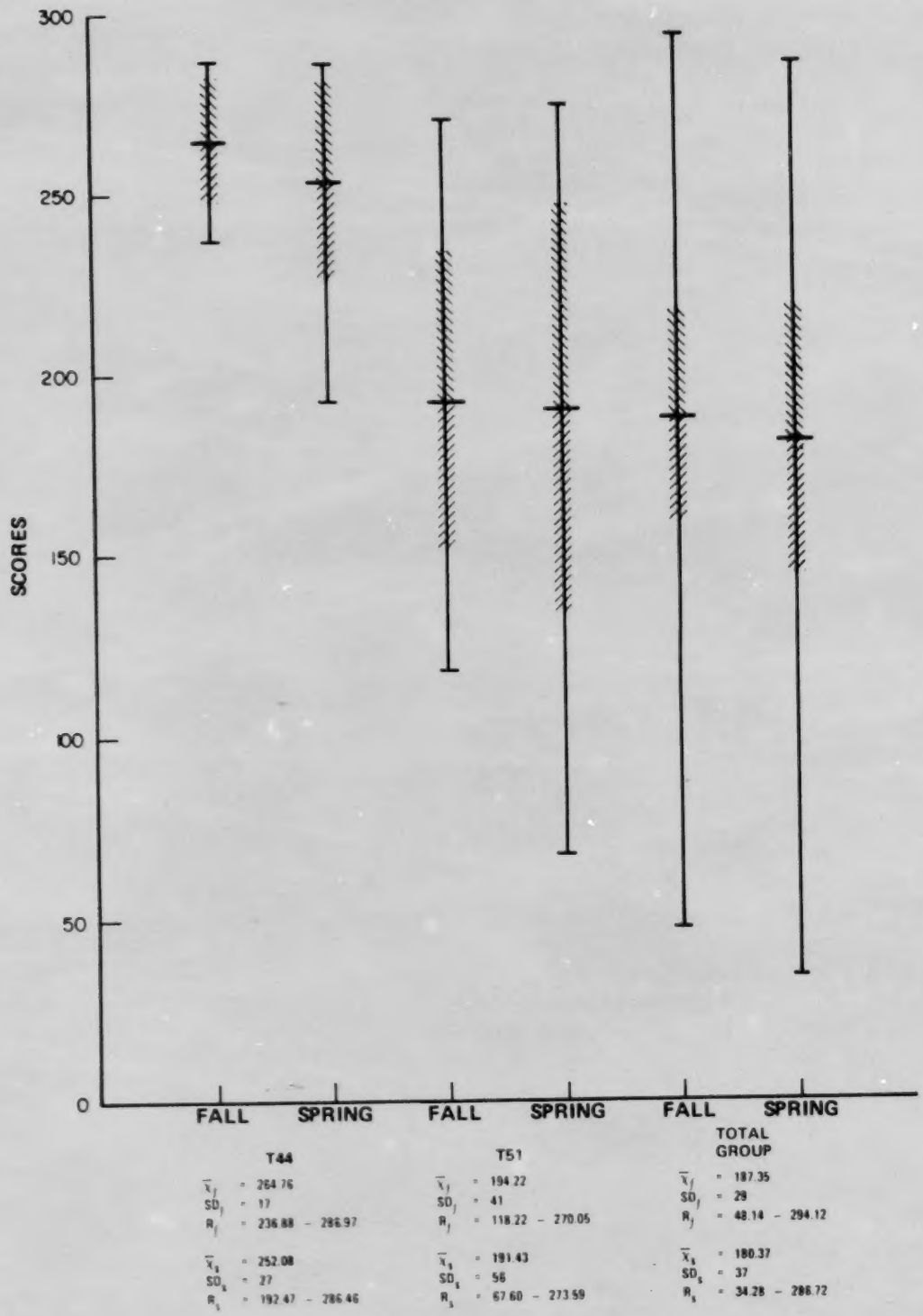


Figure 8.10a. Fall and Spring Means, Standard Deviations and Ranges for Selected Classes and the Total Group: Grade 5 Reading

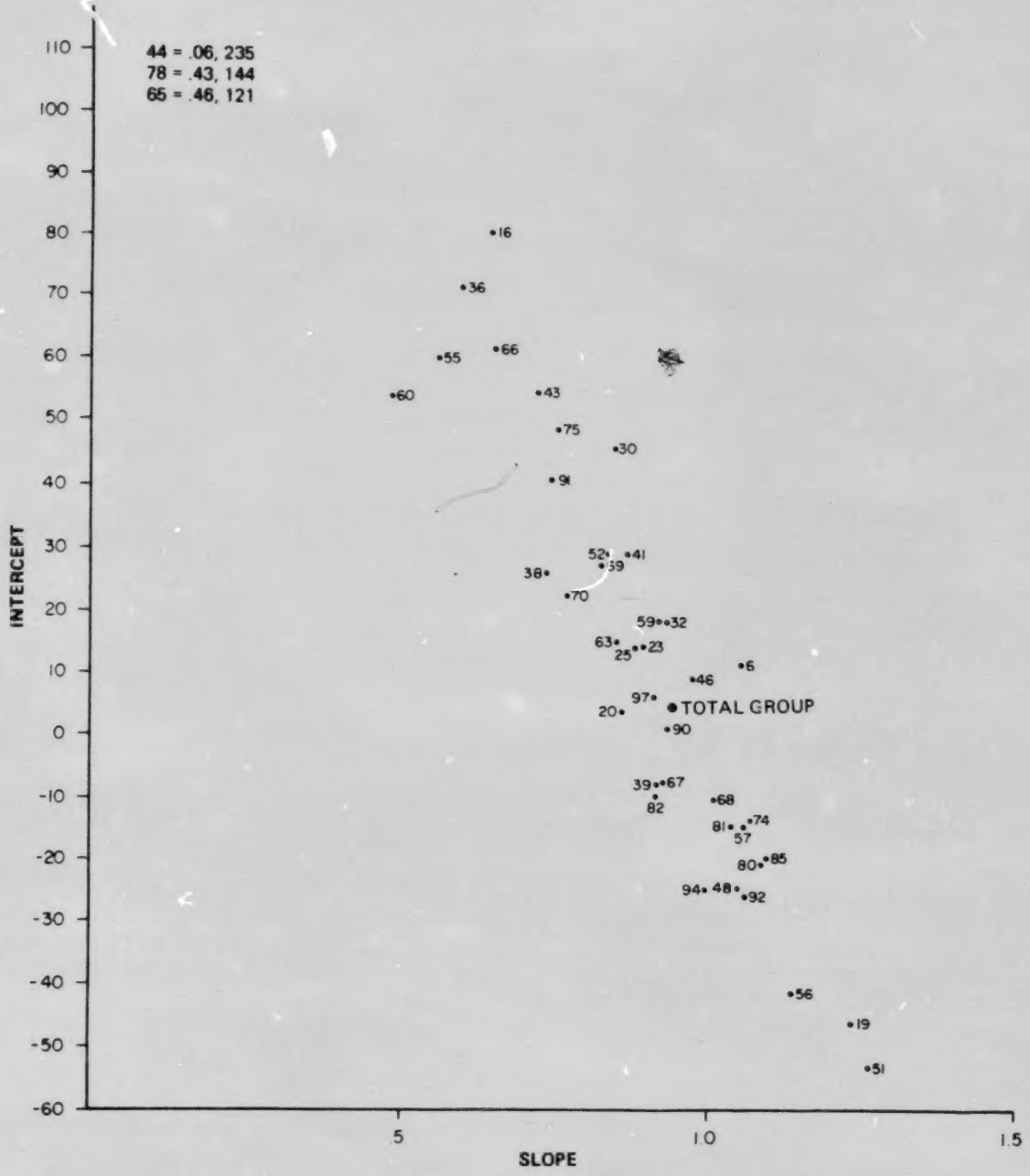


Figure 8.11. Slope (b) Plotted Against Intercept (c) For Each Teacher; Grade 5 Reading (N_T = 42)

Table 8.13

Fall and Spring Means, Standard Deviations, Ranges, Mean Difference and Standard Deviation of the Mean Difference for Each Teacher-Pupil Group for Grade 5 Reading - N_T = 42

T#	$\bar{X}_f$	SD_f	R_f	$\bar{X}_s$	SD_s	R_s	Mean Diff.	SD_{s-f}
06	206.14	44.04	115.95 - 286.97	205.78	57.28	74.47 - 286.09	- 0.37	33.48
16	246.68	25.95	196.89 - 292.86	244.28	32.86	170.10 - 286.46	- 2.40	22.57
19	193.85	19.09	164.95 - 224.81	193.05	36.92	132.63 - 236.60	- 0.80	28.82
20	154.26	35.74	48.14 - 231.72	140.17	45.04	71.04 - 217.04	-14.09	32.79
23	198.49	52.04	123.07 - 293.77	193.62	52.53	99.59 - 274.33	- 4.87	24.19
25	154.31	41.71	78.58 - 220.61	153.43	50.11	34.28 - 236.60	- 0.88	33.73
30	149.48	48.59	77.52 - 231.72	176.26	52.64	59.28 - 247.49	26.79	32.51
32	177.48	42.00	98.05 - 271.31	165.73	46.35	81.86 - 261.60	8.25	24.56
36	215.97	27.81	163.76 - 259.86	210.49	40.05	131.38 - 260.30	- 5.47	35.36
38	134.67	42.87	57.35 - 207.25	121.99	33.85	66.38 - 188.85	-12.67	27.42
39	172.08	43.92	87.30 - 266.69	154.33	52.77	71.97 - 256.21	-17.75	29.63
41	181.99	37.61	77.74 - 244.03	190.85	41.72	92.07 - 265.59	8.86	25.72
43	219.88	28.56	156.06 - 294.12	218.18	37.08	134.06 - 268.45	- 1.69	31.42
44	264.76	16.84	236.88 - 286.97	252.08	26.57	192.47 - 286.46	-12.68	30.89
46	192.89	41.74	99.92 - 263.10	198.86	49.51	97.01 - 286.09	5.97	27.91
48	208.19	43.78	90.25 - 258.60	194.41	53.65	73.44 - 267.34	-13.77	27.92

Table 8.13 (Continued)

T#	$\bar{X}_f$	SD_f	R_f	$\bar{X}_s$	SD_s	R_s	Mean Diff.	SD_{s-f}
51	194.22	40.66	118.22 - 270.05	191.43	56.44	67.60 - 273.59	- 2.79	26.10
52	185.34	61.64	81.42 - 273.58	187.16	59.66	74.88 - 280.47	1.82	30.48
55	163.48	30.03	124.10 - 224.54	57.11	37.63	102.49 - 219.00	- 6.37	35.57
56	185.59	38.75	99.38 - 260.52	170.27	55.84	71.97 - 266.26	-15.33	34.66
57	150.06	49.51	62.51 - 242.77	144.92	59.79	79.74 - 260.07	- 5.14	28.90
59	180.60	41.51	112.34 - 271.31	187.14	56.63	95.87 - 262.37	8.09	20.34
60	160.97	24.10	105.26 - 204.38	130.08	24.93	100.25 - 190.26	-30.89	25.24
63	150.70	26.88	102.56 - 208.51	146.27	41.83	95.54 - 221.41	- 4.42	34.98
65	173.39	45.01	75.37 - 252.40	200.72	35.95	138.84 - 262.37	27.31	38.19
66	180.70	22.23	144.16 - 215.08	184.17	38.02	108.37 - 253.74	3.48	35.76
67	154.06	45.77	56.63 - 249.91	136.18	49.20	74.22 - 263.19	-17.87	24.84
68	173.43	43.29	97.17 - 257.19	165.53	49.83	77.07 - 267.34	- 7.90	23.53
69	187.76	42.60	115.04 - 270.25	186.62	44.32	91.04 - 254.19	- 1.14	26.74
70	139.57	31.37	88.39 - 203.89	132.05	34.37	69.27 - 228.07	- 7.53	25.03
74	211.30	36.55	144.16 - 294.12	212.93	54.03	112.74 - 280.47	1.63	35.07
75	206.29	43.49	102.73 - 278.45	210.08	41.55	130.05 - 280.21	3.79	26.13
78	234.78	26.63	172.79 - 267.72	243.88	19.40	200.69 - 274.22	9.09	21.92
80	214.22	48.77	90.91 - 293.77	214.55	59.42	58.69 - 286.72	0.33	26.46
81	204.05	55.06	86.12 - 286.63	197.41	60.78	57.89 - 286.09	- 6.64	20.94
82	189.15	46.08	104.11 - 265.74	165.60	50.07	44.30 - 249.22	-23.55	26.69
85	217.71	41.49	108.32 - 271.31	221.03	48.94	98.44 - 267.97	3.[illegible]	[illegible]

Table 8.13 (Continued)

T#	$\bar{X}_f$	SD_f	R_f	$\bar{X}_s$	SD_s	R_s	Mean Diff.	SD_{s-f}
90	214.47	34.77	150.67 - 278.57	204.38	40.29	113.93 - 273.59	-10.09	23.46
91	201.97	40.66	127.00 - 272.35	195.82	40.44	128.11 - 266.55	- 6.15	27.87
92	168.08	43.49	91.46 - 250.08	151.93	55.60	73.44 - 267.34	-16.15	31.48
94	179.21	45.57	70.20 - 255.93	155.57	54.43	72.27 - 273.59	-23.64	29.49
97	176.50	52.99	80.95 - 258.48	169.40	57.90	79.25 - 280.58	- 7.10	31.42
	$\bar{X}_{mf}$	SD_{mf}	R_{mf}	$\bar{X}_{ms}$	SD_{ms}	R_{ms}		
TOTAL GROUP	187.35	28.66	134.67 - 264.76	180.37	37.27	57.11 - 252.01		
		$\sigma_{e_{mf}}$			$\sigma_{e_{ms}}$			

Table 8.14

Mean Difference, Standard Deviation of the Mean Difference, Slope and Intercept for the Top and Bottom Ten Classes Grade 5 Reading

Top 10 Classes

T#	$\bar{X}_f$	df	Mean Diff.	SD_{s-f}	b	c
78	234.78	13	9.09	21.92	.43	143.74
16	246.68	12	- 2.40	22.57	.67	81.89
30	149.48	21	26.79	32.51	.86	42.26
36	215.97	11	- 5.47	35.36	.62	72.96
43	219.88	22	- 1.69	31.42	.74	55.97
44	264.76	10	-12.68	30.89	.06	235.49
55	163.48	25	- 6.37	35.57	.58	61.73
60	160.97	12	-30.89	25.24	.50	36.29
65	173.39	21	27.31	38.19	.46	121.11
66	180.70	25	3.48	35.76	.67	63.30

Bottom 10 Classes

T#	$\bar{X}_f$	df	Mean Diff.	SD_{s-f}	b	c
51	194.22	17	- 2.79	26.10	1.26	- 52.79
19	193.85	13	- 0.80	28.82	1.23	- 45.51
56	185.59	29	-15.33	34.66	1.14	- 40.92
94	179.21	26	-23.64	29.49	1.00	- 24.36
92	168.08	26	-16.15	31.43	1.06	- 25.43
48	208.19	26	-13.77	27.92	1.05	- 23.65
80	214.22	22	0.33	26.46	1.09	- 20.00
85	217.71	15	3.31	17.83	1.10	- 19.16
81	204.05	22	- 6.64	20.94	1.04	- 14.81
57	150.06	13	- 5.14	28.90	1.06	- 13.97

Table 8.15

Top and Bottom Classes Paired by Order of Magnitude of Fall Means; Mean Difference and Standard Deviation of Fall Mean for Each Class Grade 5 Reading

	T#	$\bar{X}_f$	SD_f	Mean Diff.
1.	44 (T)	264.76	16.84	-12.68
	85 (B)	217.71	41.49	3.31
2.	16 (T)	246.68	25.95	- 2.40
	80 (B)	214.22	48.77	0.33
3.	78 (T)	234.78	26.63	9.09
	48 (B)	208.19	43.78	-13.77
4.	43 (T)	219.88	28.56	- 1.69
	81 (B)	204.05	55.06	- 6.64
5.	36 (T)	215.97	27.81	- 5.47
	51 (B)	194.22	40.66	- 2.79
6.	66 (T)	180.70	22.23	3.48
	19 (B)	193.85	19.09	- 0.80
7.	65 (T)	173.39	45.01	27.31
	56 (B)	185.59	38.75	-15.33
8.	55 (T)	163.48	30.03	- 6.37
	94 (B)	179.21	45.57	-23.64
9.	60 (T)	160.97	24.10	-30.89
	92 (B)	168.08	43.49	-16.15
10.	30 (T)	149.48	48.59	26.79
	57 (B)	150.06	49.51	- 5.14

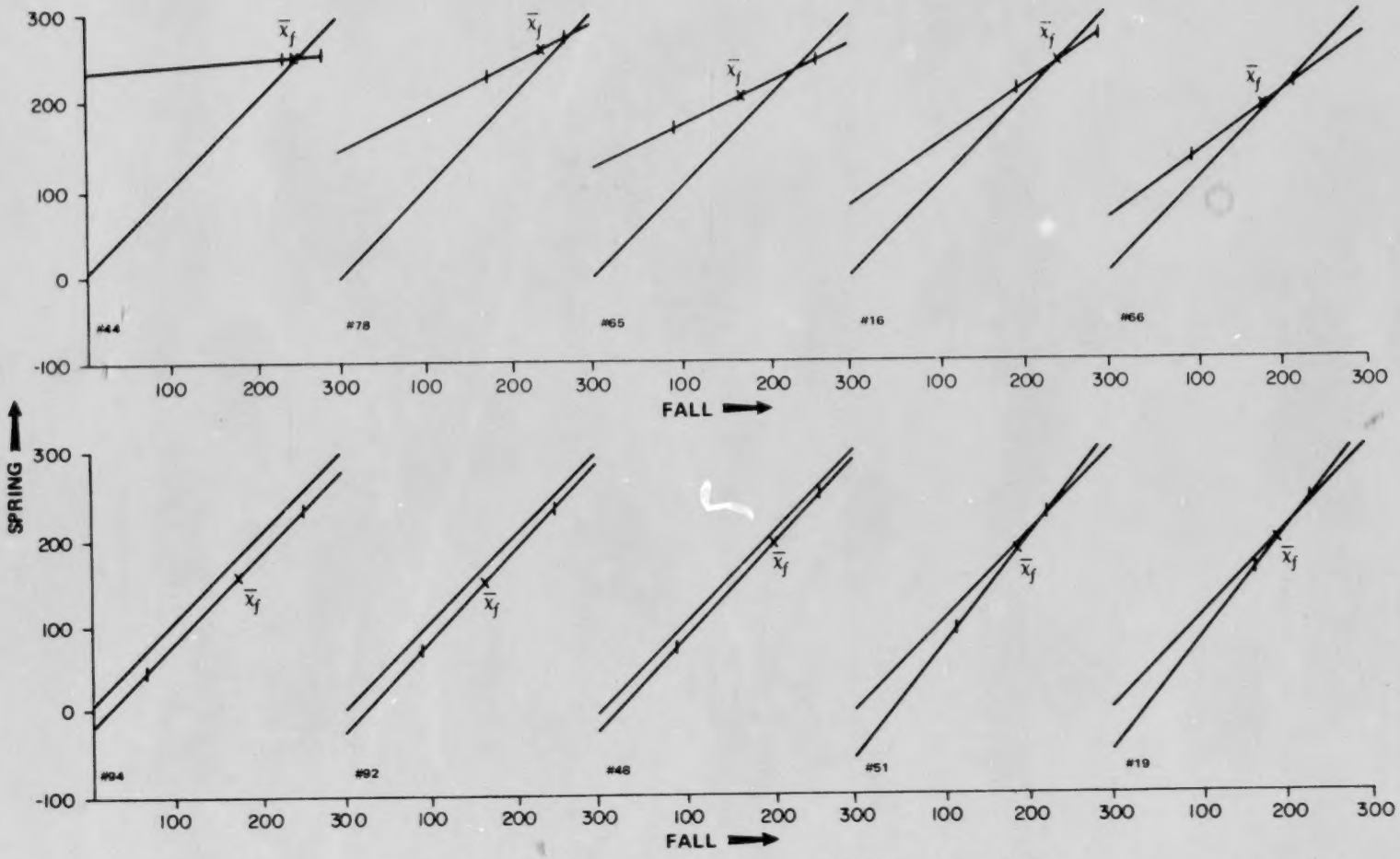


Figure 8.12. Plot of Regression Lines of Top and Bottom Five Classes Against Reference Graph Grade 5 Reading

below the reference line indicating that the classes' performance with respect to their predicted spring scores has actually dropped. The lower five classes represent a pattern of ineffective learning experiences since the classes fall at or below their fall performance. The contrast in teaching performances in Grade 5 Reading will be between teachers whose classes made gains against teachers whose classes made relatively little improvement.

The graph of T44 is interesting. This class's fall mean is the highest in the group ($\bar{X}_f$ = 264.76). By spring the mean is lower ($\bar{X}_s$ = 252.08). The variance has also increased from fall to spring. The graph in Figure 8.12 suggests what is happening. Larger gains are being made at the lower end of the scale than at the higher. The lowest pupil in the fall had answered 88 percent of the items correctly; the highest student had answered 96 percent of the items correctly. Thus students at the lower end of the scale can make proportionately larger gains.

It is reasonable to include this group among those classified as having the most effective learning experiences. Even though the spring mean of the class is lower than the fall mean, the fall mean is so high that we may be observing an instance of regression towards the mean. But in this class pupils showed growth who had "space" to grow.

The reader should make comparisons across the top five or bottom five to see how our classification procedure works. Note the differences in means and fall ranges. These statistics vary from teacher to teacher. But the classification procedure sorts out those classes where more positive changes occur across the score range from those where changes are minimal or are concentrated at the higher end of the score scale.

Analysis of Mathematics - Grade 5

This section presents the related analyses for Grade 5 Mathematics. Refer to Table 8.11 for the correlation coefficients (r), slopes (b), intercepts (c), standard error of estimates and probability of F-values for R^2 for each of the classes in Grade 5 Mathematics. All but one of the F-values are significant.

The values of r are distributed as follows:

r	f
.90 -	8
.80 - .89	12
.70 - .79	18
.60 - .69	5
.50 - .59	2
.40 - .49	0
N	45

Thirty of the values fall between .70 and .89 and there are no values of r below .50. Table 8.16 presents the distribution of r by c and r by b. Figure 8.13 presents the graphs of the regression lines of the classes with the largest and smallest slopes and the largest and smallest intercepts as well as the regression line for the entire group. The most significant relationship again is that between b and c which is presented in Figure 8.14. Table 8.17 presents the spring and fall means, their standard deviations and ranges, the mean difference and the standard deviation of the mean difference for each of the classes plotted in this graph.

Table 8.16

Frequency Distribution of Correlations (r) by Intercept (c); Frequency Distribution of Correlations (r) by Slope (b); r, b, and c Derived from Regression Analyses by Teacher; Grade 5 Mathematics N = 45

c

r	-49 to -30	-29 to -10	-9 to 0	1-9	10-19	20-29	30-39	40-49	50-59	60-69	Over 70
.90 -	1	3	2	1		1					
.80 - .89		1		6	4	4	3	1			
.70 - .79	1		1	3	2	2			1	1	
.60 - .69		1				2	2				
.50 - .59					1						1
.40 - .49											
Below .40											
N	2	5	3	10	7	9	5	1	1	1	1

b

r	.50-.59	.60-.69	.70-.79	.80-.89	.90-.99	1.00-1.09	1.10-1.19	1.20-1.29
.90 -				1		3	3	1
.80 - .89			3	4	9	3		
.70 - .79		1	1	1	7		1	
.60 - .69			2	2	1			
.50 - .59	1			1				
.40 - .49								
Below .40								
N	1	1	6	9	17	6	4	1

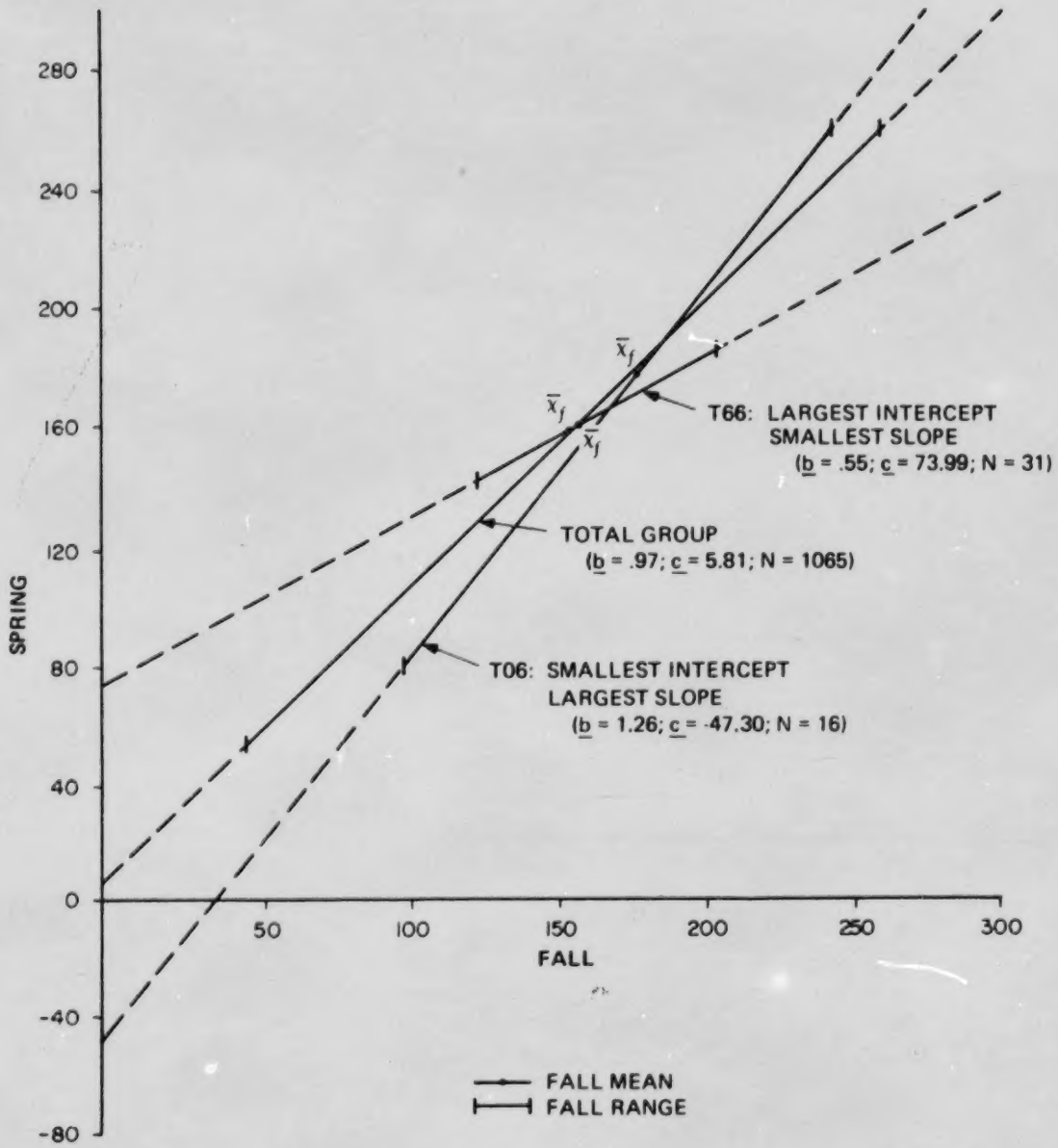
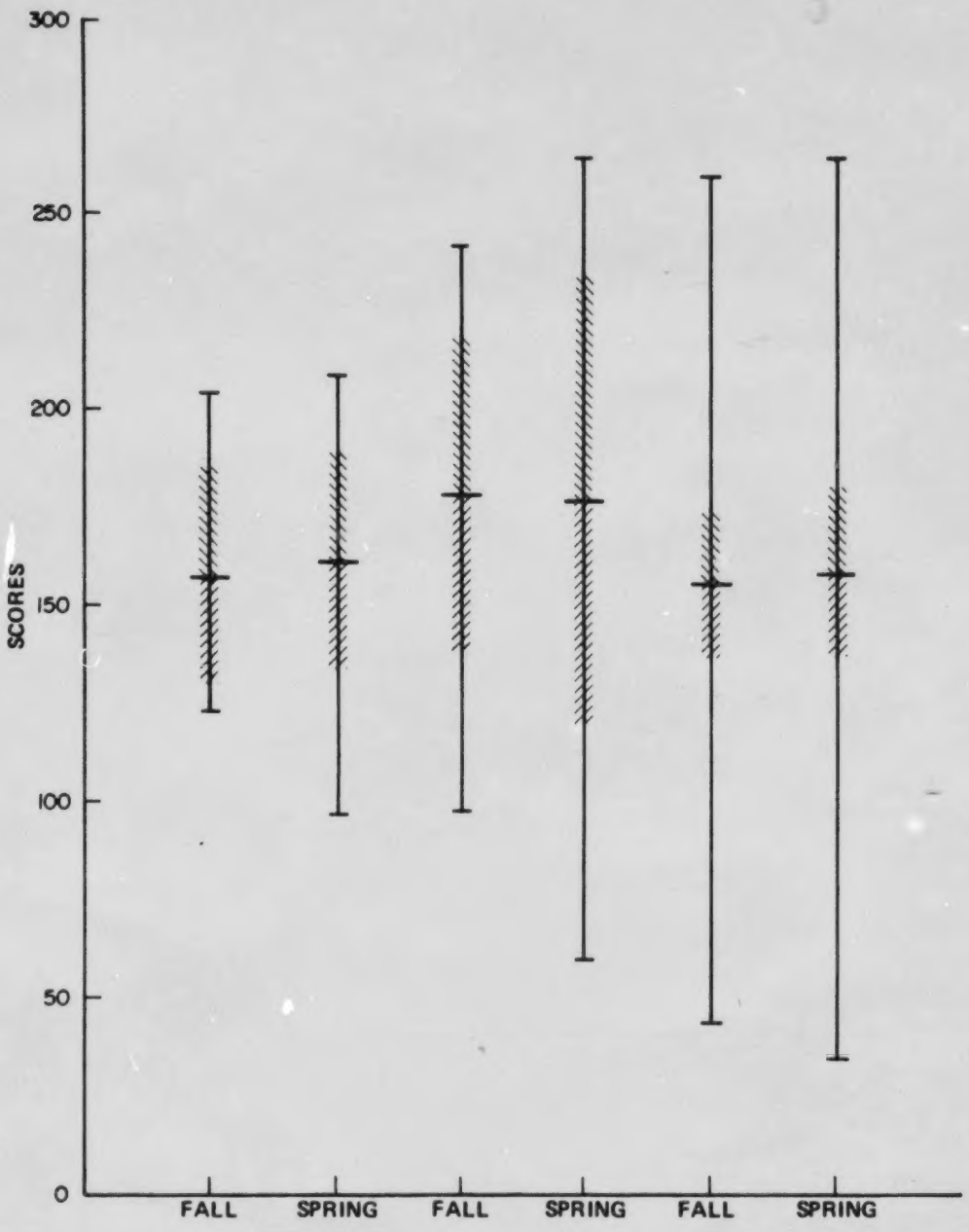


Figure 8.13. Regression Lines for Selected and Total Group: Grade 5 Mathematics



	T66	T06	TOTAL GROUP
$\bar{X}_f$	156.48	177.42	154.44
SD_f	28	41	19
R_f	122.76 – 203.37	98.00 – 241.67	43.58 – 259.69
$\bar{X}_s$	160.42	176.42	156.94
SD_s	28	58	22
R_s	97.37 – 208.42	59.74 – 263.81	34.74 – 263.81

Figure 8.13a. Fall and Spring Means, Standard Deviations and Ranges for Selected Classes and the Total Group: Grade 5 Mathematics

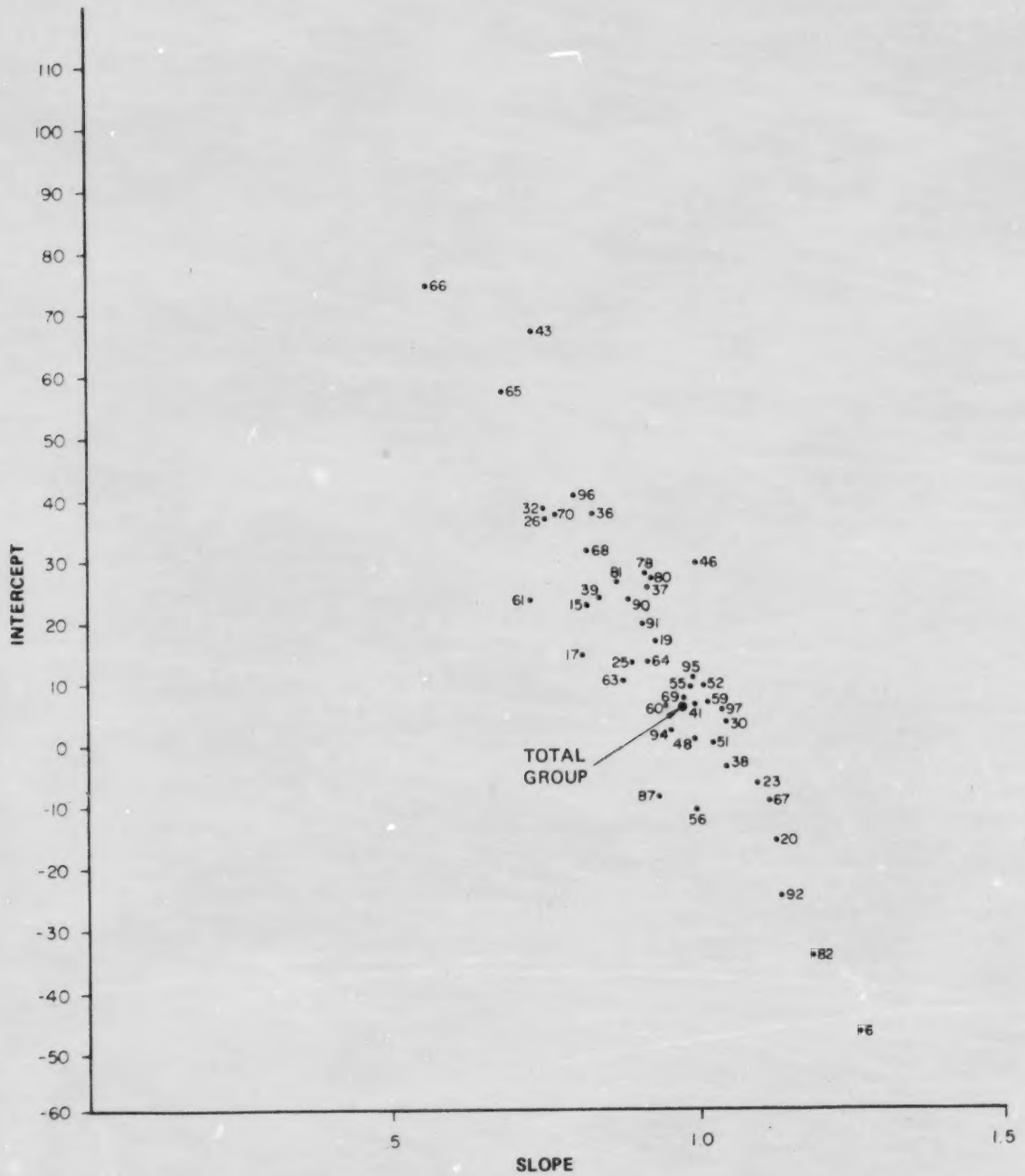


Figure 8.14. Slope (b) Plotted Against Intercept (c) For Each Teacher; Grade 5 Mathematics (N_T = 45)

Table 8.17

Fall and Spring Means, Standard Deviations, Ranges, Mean Difference and Standard Deviation of the Mean Difference for Each Teacher-Pupil Group for Grade 5 Mathematics - N_T = 45

T#	$\bar{X}_f$	SD_f	R_f	$\bar{X}_s$	SD_s	R_s	Mean Diff.	SD_{s-f}
06	177.42	41.47	98.00 - 241.67	176.42	58.03	59.74 - 263.81	- 1.00	27.37
15	138.34	20.68	95.72 - 176.00	137.49	21.20	55.09 - 188.56	- .85	21.52
16	81.96	13.46	56.13 - 99.01	85.90	17.67	65.87 - 121.05	3.94	18.76
17	183.96	28.33	123.51 - 231.43	187.21	42.91	77.11 - 256.53	3.24	26.80
19	157.15	28.85	88.37 - 207.75	160.93	36.17	76.18 - 240.79	3.78	24.71
20	138.26	32.79	77.07 - 201.71	138.93	40.07	51.70 - 221.20	.67	16.39
23	173.31	35.63	88.12 - 239.30	181.44	43.16	94.29 - 256.67	8.13	19.29
25	135.02	38.85	57.19 - 197.73	132.71	39.36	40.32 - 196.45	- 2.31	19.63
26	139.58	39.01	65.43 - 221.93	138.44	35.22	66.24 - 200.52	- 1.14	22.86
30	152.89	47.89	55.75 - 220.15	162.20	53.71	64.07 - 259.14	9.31	20.08
32	136.44	33.51	80.83 - 197.21	139.15	28.47	83.88 - 203.23	2.71	16.22
36	160.75	23.82	123.93 - 217.47	169.17	30.44	79.73 - 213.67	8.42	23.70
37	131.94	45.40	63.18 - 225.82	145.02	47.19	34.74 - 214.65	13.07	22.94
38	132.02	35.88	75.36 - 221.93	131.15	39.44	74.67 - 224.61	- .87	16.08
39	154.83	32.60	85.39 - 219.50	151.66	31.35	103.18 - 227.76	- 3.17	16.56
41	170.30	26.53	99.21 - 203.22	174.98	33.68	106.05 - 230.08	4.69	20.95
43	190.77	24.03	140.98 - 234.30	203.31	21.72	155.20 - 233.20	12.55	14.85
46	141.17	29.15	99.67 - 197.23	168.81	38.45	94.29 - 214.61	27.64	25.32
48	181.80	35.11	116.46 - 236.87	179.45	46.21	51.79 - 256.73	- 2.35	30.58

Table 8.17 (Continued)

T#	$\bar{X}_f$	SD_f	R_f	$\bar{X}_s$	SD_s	R_s	Mean Diff.	SD_{s-f}
51	150.65	45.60	67.33 - 229.45	153.45	53.05	47.96 - 231.97	2.80	25.79
52	156.45	45.92	69.83 - 215.15	164.97	48.77	70.29 - 247.76	8.52	16.73
55	137.57	29.98	68.00 - 198.72	143.63	36.20	81.24 - 220.03	6.06	21.22
56	168.05	39.64	85.53 - 243.52	154.43	43.77	78.88 - 231.53	-13.61	19.70
59	175.39	36.86	107.07 - 243.27	182.33	43.13	113.77 - 246.95	6.94	21.93
60	137.71	27.90	97.93 - 217.93	135.23	35.49	69.94 - 210.08	- 2.48	24.00
61	120.97	28.55	58.18 - 177.97	110.34	30.37	59.47 - 177.05	-10.63	23.60
63	118.07	29.98	64.90 - 176.34	112.66	30.39	69.35 - 183.35	- 5.41	16.30
64	160.75	34.34	99.22 - 204.07	159.43	40.01	97.21 - 218.05	- 1.31	25.00
65	164.67	28.14	104.09 - 229.45	167.50	26.29	95.24 - 203.04	2.83	20.48
66	156.48	27.84	122.76 - 203.37	160.42	28.25	97.37 - 208.42	3.94	26.78
67	133.54	39.78	67.15 - 224.87	138.33	49.10	48.86 - 238.94	4.79	21.73
68	144.12	37.82	85.53 - 219.99	148.24	38.61	77.31 - 224.80	4.12	24.29
69	163.03	29.70	111.90 - 219.99	165.59	36.12	90.54 - 230.79	2.55	21.71
70	117.37	18.84	77.84 - 158.22	125.80	20.94	93.13 - 178.04	8.42	15.95
78	182.86	23.34	136.76 - 232.80	193.41	30.60	125.18 - 249.33	10.54	22.16
80	183.82	38.54	79.83 - 234.45	192.97	40.81	108.88 - 263.15	9.15	21.49
81	175.75	55.62	53.37 - 259.69	177.68	51.43	60.89 - 254.12	1.93	20.06
82	151.69	29.14	89.78 - 200.48	143.41	43.99	50.23 - 211.44	- 8.29	28.07
87	138.75	32.88	87.41 - 227.93	119.89	38.97	57.13 - 228.85	-18.86	24.39

Table 8.17 (Continued)

T#	$\bar{X}_f$	SD_f	R_f	$\bar{X}_s$	SD_s	R_s	Mean Diff.	SD_{s-f}
90	186.92	24.40	146.41 - 234.89	186.95	31.67	97.60 - 240.98	.03	23.54
91	173.37	36.37	112.29 - 234.33	175.61	39.33	80.16 - 226.39	2.24	21.99
92	147.78	37.75	86.70 - 232.80	142.36	46.20	55.23 - 237.96	- 5.42	18.21
94	144.73	38.81	43.58 - 208.65	140.39	41.84	63.23 - 204.89	- 4.34	19.65
95	151.11	31.85	89.98 - 213.51	158.25	36.23	89.73 - 207.48	7.14	18.38
96	155.75	31.67	99.35 - 210.28	163.16	30.08	94.73 - 217.19	7.41	17.93
97	156.62	37.27	84.15 - 215.82	167.34	44.17	90.20 - 235.79	10.72	21.63
	$\bar{X}_{mf}$	SD_{mf}	R_{mf}	$\bar{X}_{ms}$	SD_{ms}	R_{ms}		
TOTAL GROUP	154.44	19.36	117.37 - 190.77	156.94	22.16	110.34 - 203.31		
		$\sigma_{e_{mf}}$			$\sigma_{e_{ms}}$			

Table 8.18 presents the top and bottom classes, giving for each class its fall mean, mean difference, standard deviation of the mean difference, slope and intercept. Note again that in the top ten classes, all slopes are less than 1 and all intercepts are positive and substantial; whereas in the bottom ten classes slopes are close to or greater than 1 and all intercepts except one (T48) are negative. Table 8.19 pairs the classes in the top and bottom ten by rank ordering them in terms of the magnitude of their mean fall score. In this case the mean fall score of the classes in the top ten when paired with classes in the bottom ten is smaller in seven of the pairs. The member of a pair from the top ten also has a smaller variance in seven of the pairs.

In Figure 8.15 the regression lines of the top and bottom five classes are plotted against the reference graph with the fall ranges indicated on each regression line. The first three pairs, T43-T06, T66-T82, T65-T92 present the pattern with which we are now familiar. T46 is the first instance of a regression line parallel to the reference graph, and, interestingly, its contrast is also a line parallel to the reference graph but below it. Again, in the top and bottom groups we are contrasting classes where the lower end of the class has made greater gains (with one exception, T46) with classes where students at the higher end of the score intervals have made greater gains, except in this case two of the bottom classes fall below their initial-score level.

Table 8.18

Mean Difference, Standard Deviation of the Mean Difference, Slope and Intercept for the Top and Bottom Ten Classes Grade 5 Mathematics

Top 10 Classes

T#	$\bar{X}_f$	df	Mean Diff.	SD_{s-f}	b	c
66	156.48	16	3.94	26.78	.55	73.99
43	190.77	23	12.55	14.85	.72	66.45
65	164.67	25	2.83	20.48	.67	56.89
96	155.75	19	7.41	17.93	.79	40.02
36	160.75	26	8.42	23.70	.82	37.05
70	117.37	22	8.42	15.95	.76	36.78
32	136.44	23	2.71	16.22	.74	37.68
26	139.58	29	- 1.14	22.86	.74	35.74
46	141.17	12	- 27.64	25.32	.99	28.70
68	144.12	21	4.12	24.29	.81	30.81

Bottom 10 Classes

T#	$\bar{X}_f$	df	Mean Diff.	SD_{s-f}	b	c
06	177.42	31	- 1.00	27.37	1.26	-47.30
82	151.69	28	- 8.29	28.07	1.18	-34.89
92	147.78	26	- 5.42	18.21	1.13	-25.02
20	138.26	30	0.67	16.39	1.12	-16.17
56	168.05	29	-13.61	19.70	.99	-11.28
87	138.75	23	-18.86	24.39	.93	- 8.72
67	133.54	19	4.79	21.73	1.11	-10.27
23	173.31	25	8.13	19.29	1.09	- 6.98
38	132.02	21	- 0.87	16.08	1.04	- 4.42
48	181.80	25	- 2.35	30.58	.99	0.07

Table 8.19

Top and Bottom Classes Paired by Order of Magnitude of Fall Means; Mean Differences and Standard Deviation of Fall Mean for Each Class
Grade 5 Mathematics

	T#	$\bar{X}_f$	SD_f	Mean Diff.
1.	43 (T)	190.77	24.03	12.55
	48 (B)	181.80	35.11	- 2.35
2.	65 (T)	164.67	28.14	2.83
	06 (B)	177.42	41.47	- 1.00
3.	36 (T)	160.75	23.82	8.42
	23 (B)	173.31	35.63	8.13
4.	66 (T)	156.48	27.84	3.94
	56 (B)	168.05	39.64	-13.61
5.	96 (T)	155.75	31.67	7.41
	82 (B)	151.69	29.14	- 8.29
6.	68 (T)	144.12	37.82	4.12
	92 (B)	147.78	37.75	- 5.42
7.	46 (T)	141.17	29.15	27.64
	87 (B)	138.75	32.88	-18.86
8.	26 (T)	139.58	39.01	- 1.14
	20 (B)	138.26	32.79	0.67
9.	32 (T)	136.44	33.51	2.71
	67 (B)	133.54	39.78	4.79
10.	70 (T)	117.37	18.84	8.42
	38 (B)	132.02	35.88	- 0.87

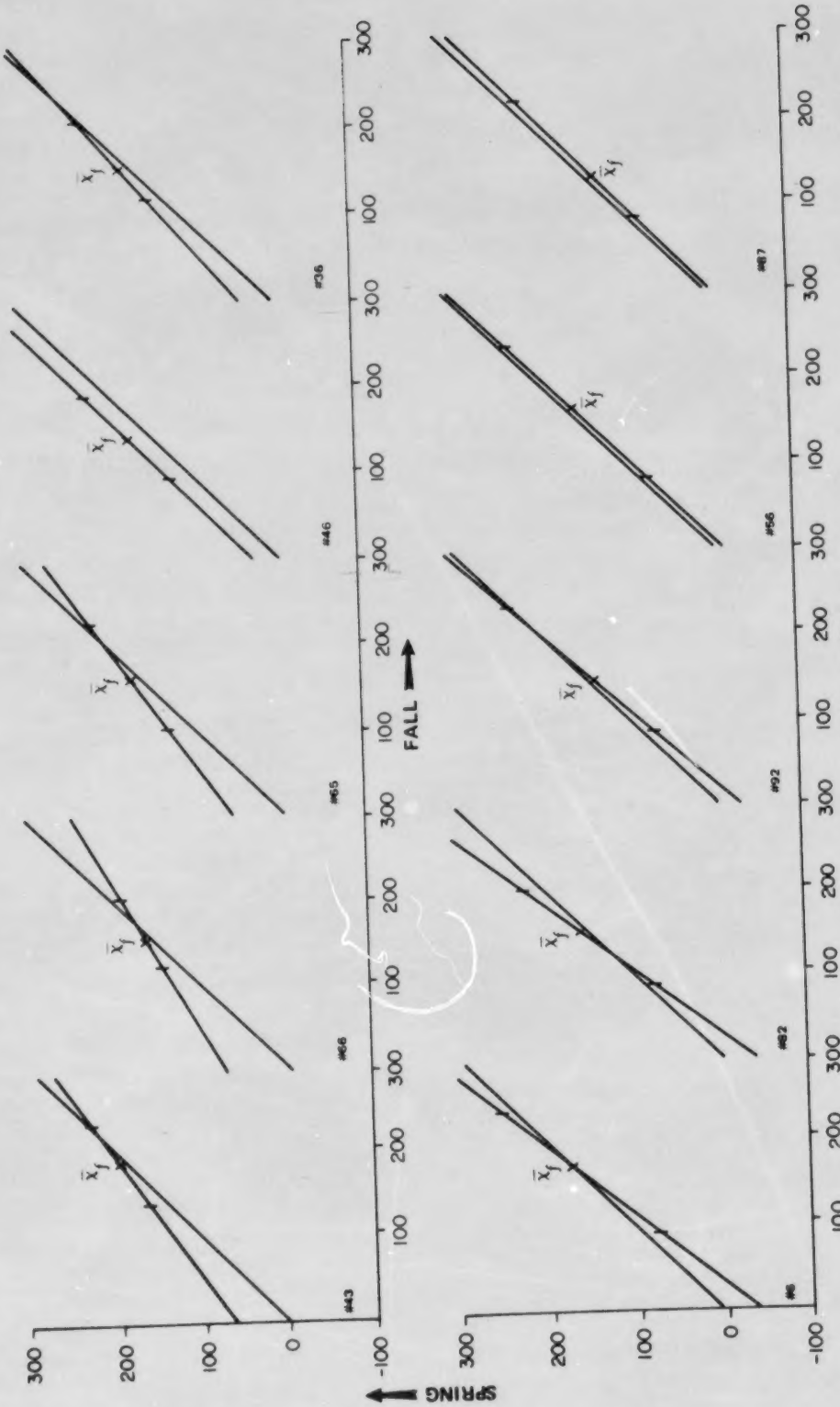


Figure 8.15. Regression Lines of Top and Bottom Five Classes Plotted Against the Reference Graph Grade 5 Mathematics

Comparison of Top and Bottom Classes in
Reading and Mathematics - Grade 5

Table 8.20 is a contingency table in which the teachers that taught both reading and mathematics are sorted in terms of their position in the top, middle and bottom groups as defined by the criterion we have been using. The upper half of the table lists the classes by number, the lower half presents the frequency in the cells. Interestingly, there are no reversals at Grade 5. The significance of the distribution in the contingency table is not significant as can be seen from the Chi-square value. A tendency, insofar as there is one in this array, is for classes at the extremes in one subject to move towards the middle in the other.

Other Factors Influencing Student Learning

In the previous sections the analyses presented treated the relation of fall to spring reading and mathematics total scores. These analyses showed the relation of previous knowledge or skill in reading and mathematics to subsequent learning in these subjects. Substantial relations were observed which are portrayed below in the correlation coefficients, slopes and intercepts for the total group:

Grade 2	r	b	c	df
Reading	.82	.90	31.75	642
Mathematics	.80	.85	47.90	735
Grade 5				
Reading	.83	.95	4.99	934
Mathematics	.86	.97	5.81	1065

Table 8.20

Distribution of Classes by Location of Scores in Reading and Mathematics in Top and Bottom 10 or Middle; Grade 5

Mathematics

Reading	Top	Middle	Bottom
Top	36, 43, 65, 66	78, 30, 55, 60	
Middle	32, 46, 68, 70	25, 39, 41, 52, 59, 63, 69, 90, 91, 97	82, 6, 20, 23, 38, 67
Bottom		80, 81, 85, 94, 19, 51	92, 48, 56

Mathematics

Reading	Top	Middle	Bottom	
Top	4	4	0	8
Middle	4	10	6	20
Bottom	$\frac{0}{8}$	$\frac{6}{20}$	$\frac{3}{9}$	$\frac{9}{37}$

READING ONLY 74, 75, 16*, 44*, 57* 85**

MATHEMATICS ONLY 87**, 95, 96*, 15, 17, 26*, 37, 61, 64

$\chi^2 = 7.60$

$df = 4$

$.20 > p > .10$

*Top Ten

**Bottom Ten

As can be seen in these figures, the correlations between fall and spring scores are substantial. One way to interpret this relation is to observe that fall scores account for 64 percent to 74 percent of the variance in spring scores. Thus, there is 36 percent to 26 percent of this variance to be accounted for by other factors.

The slopes are near 1. The intercepts for Grade 2 are substantial. At Grade 2 a score of 0 for reading in the fall is equivalent to a score of 32 in the spring; and for mathematics a fall score of 0 is equivalent to a spring score of 48. At Grade 5, however, the intercepts are relatively small. The slope gives the amount of increase in these scores for each unit of increase in the spring score.

These changes are illustrated in the table below. Recall that the score range was from 0-300. Points along this scale are transformed into equivalent spring scores by using the prediction equation, $Y' = bX+c$. The regression equations for each subject and grade appear below.

Predicted Spring Scores

	GRADE 2		GRADE 5	
Fall Score	READING (Y'=.90X+31.75)	MATHEMATICS (Y'=.85X+47.90)	READING (Y'=.95X+4.99)	MATHEMATICS (Y'=.97X+5.81)
50	76.75	90.40	52.49	54.31
100	121.75	132.90	99.99	102.81
150	166.75	175.40	147.49	151.31
200	211.75	217.90	194.99	199.81
250	256.75	260.40	242.49	248.31

In the table above, Y'-values have been computed by entering the X-values from 50-250. These equations are portrayed in Figure 8.16. Since the slopes are in all cases less than 1, changes are slightly larger at the lower end of the score interval; for Grade 5, students at the upper end of the score interval are about where they began. The mean change is relatively small at the fifth grade.[11]

These data probably describe a general pattern. Why the mean difference should be so small at the fifth grade is a puzzle. But the reader should note that a quite different picture appears when each class is analyzed separately. As was pointed out in the preceding sections, the differences in slope and intercept among classes is the interesting fact. In the following sections we consider the influence of student characteristics on learning.

The Relation of Pupil Aptitude and Personality Characteristics to Learning

An aptitude measure, a cognitive style measure, and measures of attitude and expectations were used to assess the relative influence of these variables. The reader will recall that in Figure 2.6 paths are drawn from these variables to the box labelled "Learning."

Scores for each of these variables were correlated with difference scores for total reading and total mathematics. These zero-order correlations are presented in Table 8.21. If we use $r = .30$ as the level at which we consider an r significant, only three of them are significant.

---

[11] Recall that $c = \bar{Y} - b\bar{X}$. With $b = .95$ and .97 for fifth-grade reading and mathematics, and with $c = 4.99$ and 5.81 respectively, there is obviously a difference between $\bar{Y}$ and $\bar{X}$ that is only slightly larger than the intercept-values.

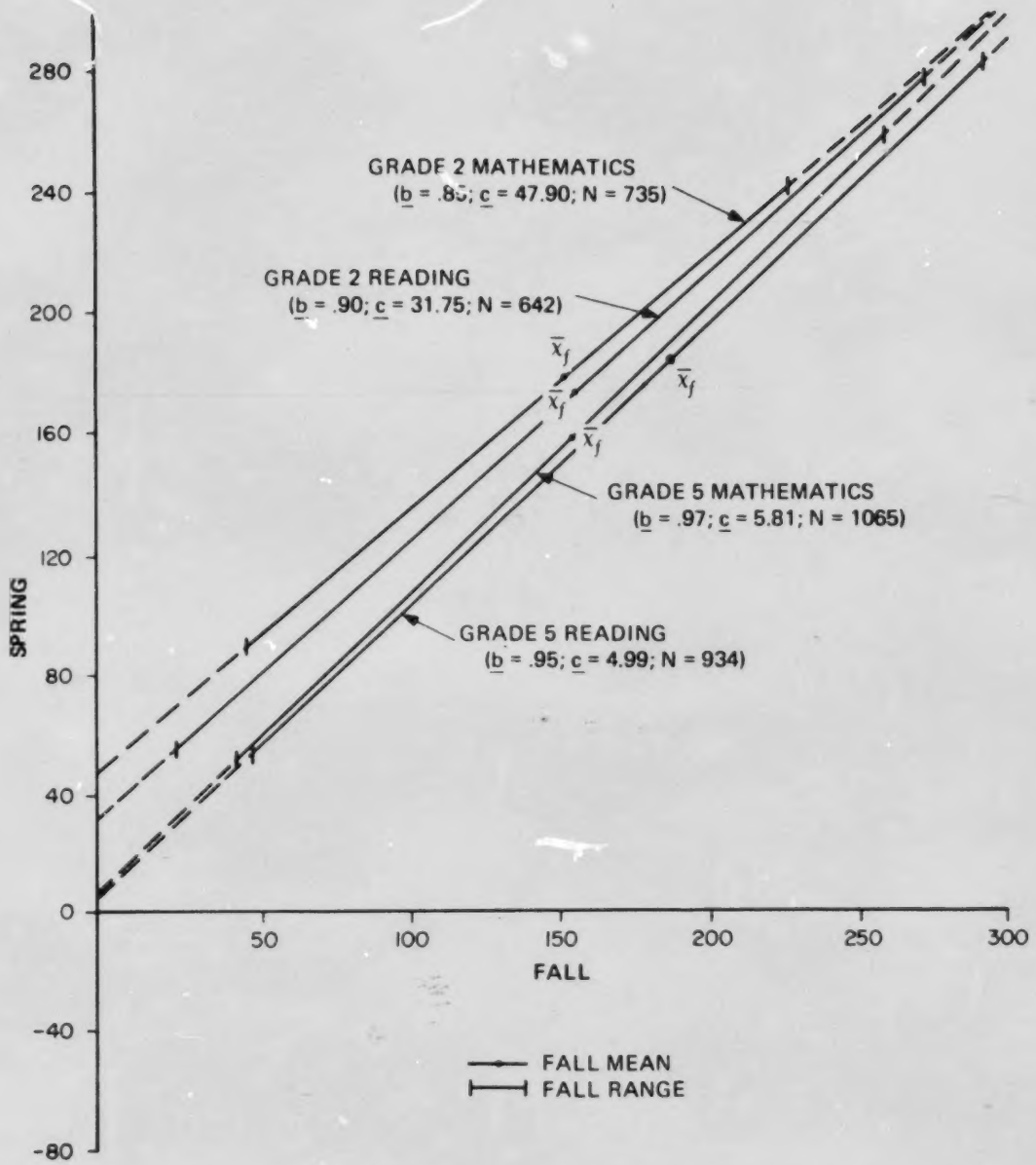


Figure 8.16. Regression Lines for Total Group, Grades 2 and 5; Reading and Mathematics

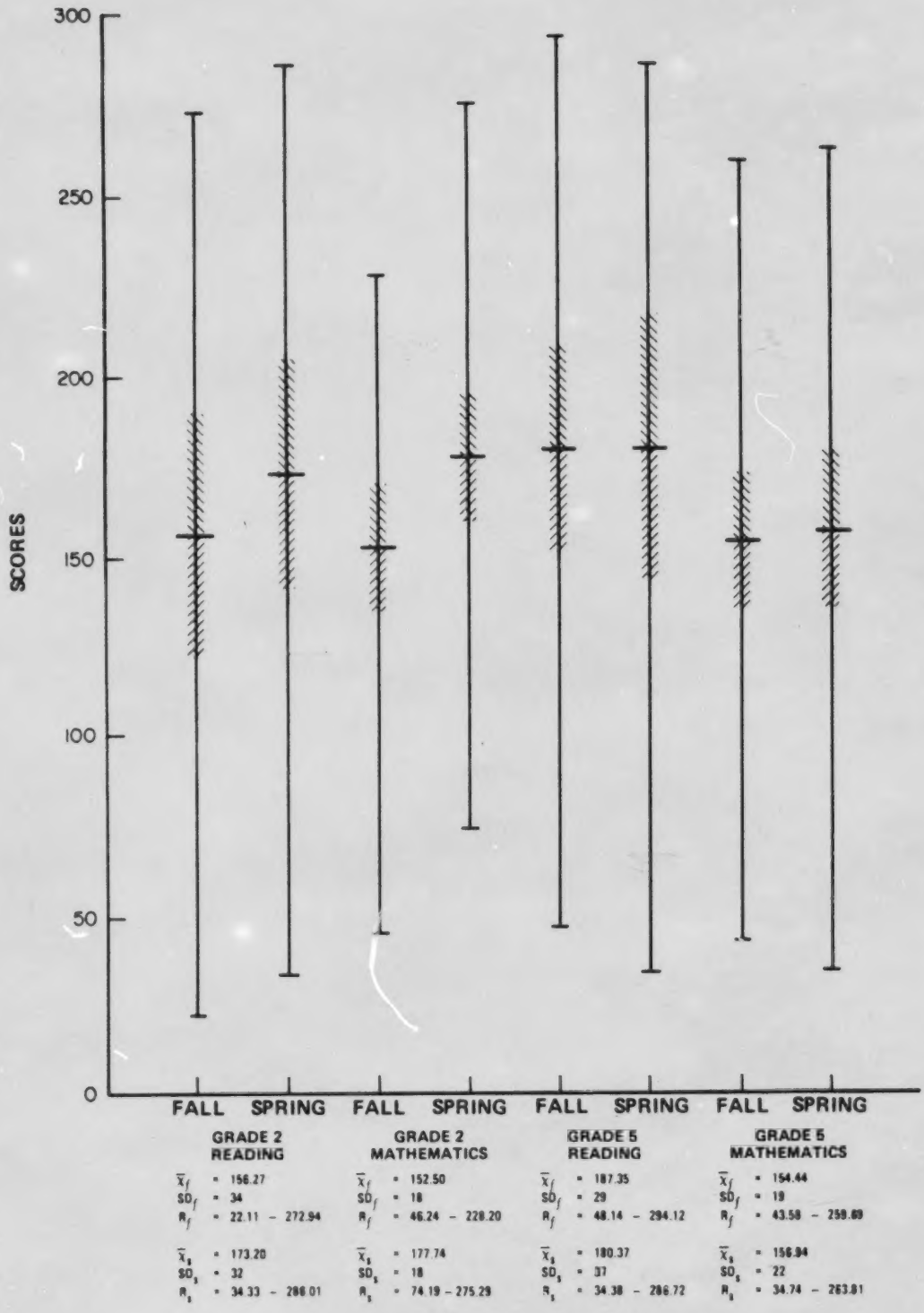


Figure 8.16a. Fall and Spring Means, Standard Deviations and Ranges for the Total Group: Grades 2 and 5, Reading and Mathematics

Table 8.21

Correlations of Difference Scores in Reading and Mathematics Total Scores with Student Variables; Grades 2 and 5

STUDENT VARIABLES	READING	MATHEMATICS
	Grade 2	
	r	r
APTITUDE	-.21	-.21
COGNITIVE STYLE	-.13	-.15
ATTITUDE - FALL	.03	.40
ATTITUDE - SPRING	.24	.41
EXPECTATIONS - FALL	-.29	-.15
EXPECTATIONS - SPRING	-.18	-.26
	Grade 5	
APTITUDE	.06	-.05
COGNITIVE STYLE	.15	.10
ATTITUDE - FALL	-.07	-.37
ATTITUDE - SPRING	.21	.07
EXPECTATIONS - FALL	-.26	-.20
EXPECTATIONS - SPRING	.03	.08

It should not be concluded, however, that these variables do not correlate with the fall and spring total scores as can be seen from Table 8.21a. At Grade 2, aptitude, cognitive style and expectations correlate significantly with fall and spring scores. At Grade 5, aptitude and cognitive style correlate significantly with total scores, but expectations do not. (For mathematics, fall expectations do correlate, $\underline{r} = .35$, with fall scores, and spring expectations with spring socres, but the consistent relation apparent at Grade 2 does not appear.)

Aptitude has the largest correlations with total scores. Aptitude, considered alone accounts for about 36 percent to 69 percent of the variance in either fall or spring scores. But as Table 8.22 indicates, there is considerable intercorrelation among the variables. We have also pointed out that fall scores account for much of the variance in spring scores, and as can be seen in Table 8.21, aptitude and fall scores correlate substantially particularly at the fifth grade.

The correlations among these variables are presented in Table 8.22. Cognitive style and aptitude correlate at both grades ($\underline{r}$ ranges from .49 to .55). Attitudes and expectations measured at the same time correlate ($\underline{r}$ ranges from .36 to .49) at Grade 5 but the correlations are very low at Grade 2.

There are several correlations worth noting in Tables 8.21, 8.21a and 8.22:

1. Attitudes do not correlate significantly with the differences between fall and spring scores (Table 8.21)

Table 8.21a

Correlations of Student Variables with Total Scores

GRADE 2

	READING (N = 40 classrooms)		MATHEMATICS (N = 41 classrooms)	
	f*	s*	f	s
APTITUDE	.60	.61	.65	.56
COGNITIVE STYLE	.41	.45	.49	.50
ATTITUDE - FALL	-.10	-.07	-.07	0.00
ATTITUDE - SPRING	-.15	-.11	-.11	-.08
EXPECTATIONS - FALL	.39	.38	.46	.36
EXPECTATIONS - SPRING	.42	.46	.33	.39

GRADE 5

	READING (N = 53 classrooms)		MATHEMATICS (N = 54 classrooms)	
	f	s	f	s
APTITUDE	.83	.79	.72	.68
COGNITIVE STYLE	.49	.52	.50	.51
ATTITUDE - FALL	.23	.24	.26	.24
ATTITUDE - SPRING	.30	.35	.32	.38
EXPECTATIONS - FALL	.23	.23	.35	.29
EXPECTATIONS - SPRING	.24	.29	.28	.46

*f: Fall; s: Spring

Table 8.22

Correlations Among Student Variables

Grade 2 - Reading (N = 40 classrooms)

	Apt.	Cog. Style	Att-F	Att-S	Exp.-F
APTITUDE	1.00				
COGNITIVE STYLE	.49	1.00			
ATTITUDE - FALL	- .13	- .08	1.00		
ATTITUDE - SPRING	- .24	- .07	.42	1.00	
EXPECTATIONS - FALL	.27	.22	.02	- .06	1.00
EXPECTATIONS - SPRING	.35	.23	.07	.02	.40

Grade 2 - Mathematics (N = 41 classrooms)

	Apt.	Cog. Style	Att-F	Att-S	Exp.-F
APTITUDE	1.00				
COGNITIVE STYLE	.51	1.00			
ATTITUDE - FALL	- .13	- .07	1.00		
ATTITUDE - SPRING	- .20	.05	.42	1.00	
EXPECTATIONS - FALL	.36	.28	.03	- .03	1.00
EXPECTATIONS - SPRING	.33	.23	.04	.02	.30

Grade 5 - Reading (N = 53 classrooms)

	Apt.	Cog. Style	Att-F	Att-S	Exp.-F
APTITUDE	1.00				
COGNITIVE STYLE	.55	1.00			
ATTITUDE - FALL	.25	.07	1.00		
ATTITUDE - SPRING	.33	.15	.64	1.00	
EXPECTATIONS - FALL	.25	.08	.47	.38	1.00
EXPECTATIONS - SPRING	.23	.10	.25	.36	.35

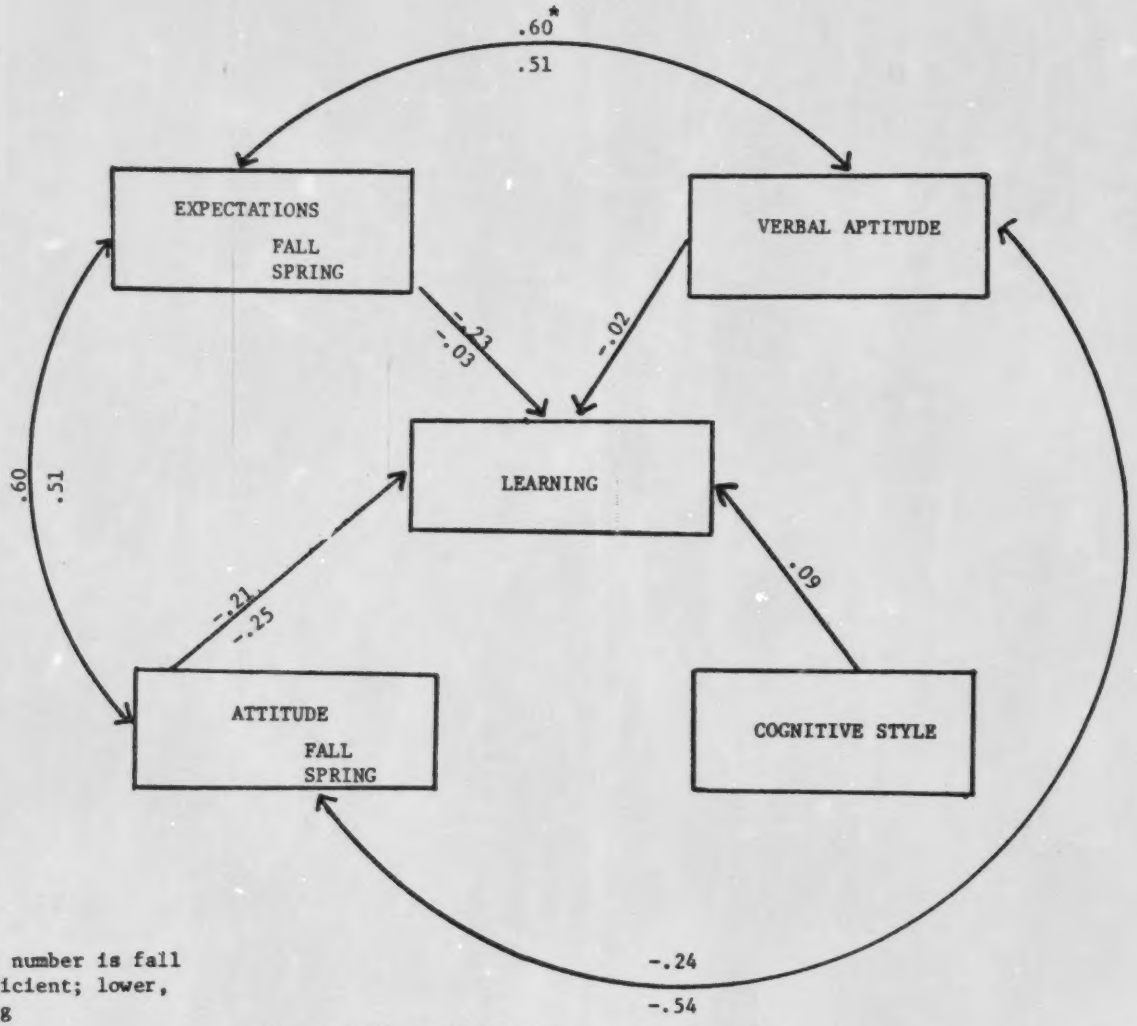
Grade 5 - Mathematics (N = 54 classrooms)

	Apt.	Cog. Style	Att-F	Att-S	Exp.-F
APTITUDE	1.00				
COGNITIVE STYLE	.54	1.00			
ATTITUDE - FALL	.25	.07	1.00		
ATTITUDE - SPRING	.31	.11	.64	1.00	
EXPECTATIONS - FALL	.27	.15	.49	.40	1.00
EXPECTATIONS - SPRING	.21	.16	.27	.42	.37

2. There is a moderate relation between attitudes in the fall and in the spring. (r = .42 in Grade 2 and r = .64 in Grade 5; see Table 8.22).
3. Pupil expectations correlate significantly with reading and mathematics scores only at the second grade.
4. Cognitive style is a significant predictor of both fall and spring scores.
5. Aptitude is the most significant predictor of fall and spring scores.
6. Cognitive style and aptitude correlate (r = .49 -.55).

Another way to look at the data is to use the path coefficients. In the path analysis, interrelations among the variables are taken into account. Figure 8.17 presents the path diagrams for these variables with the corresponding path and correlation coefficients. Paths are represented by straight lines and correlations with curved lines. We will use the rule-of-thumb that a path coefficient must be .25 or larger or -.25 or smaller to be considered significant. Therefore, only one of the path coefficients in Figure 8.17 should be considered significant.

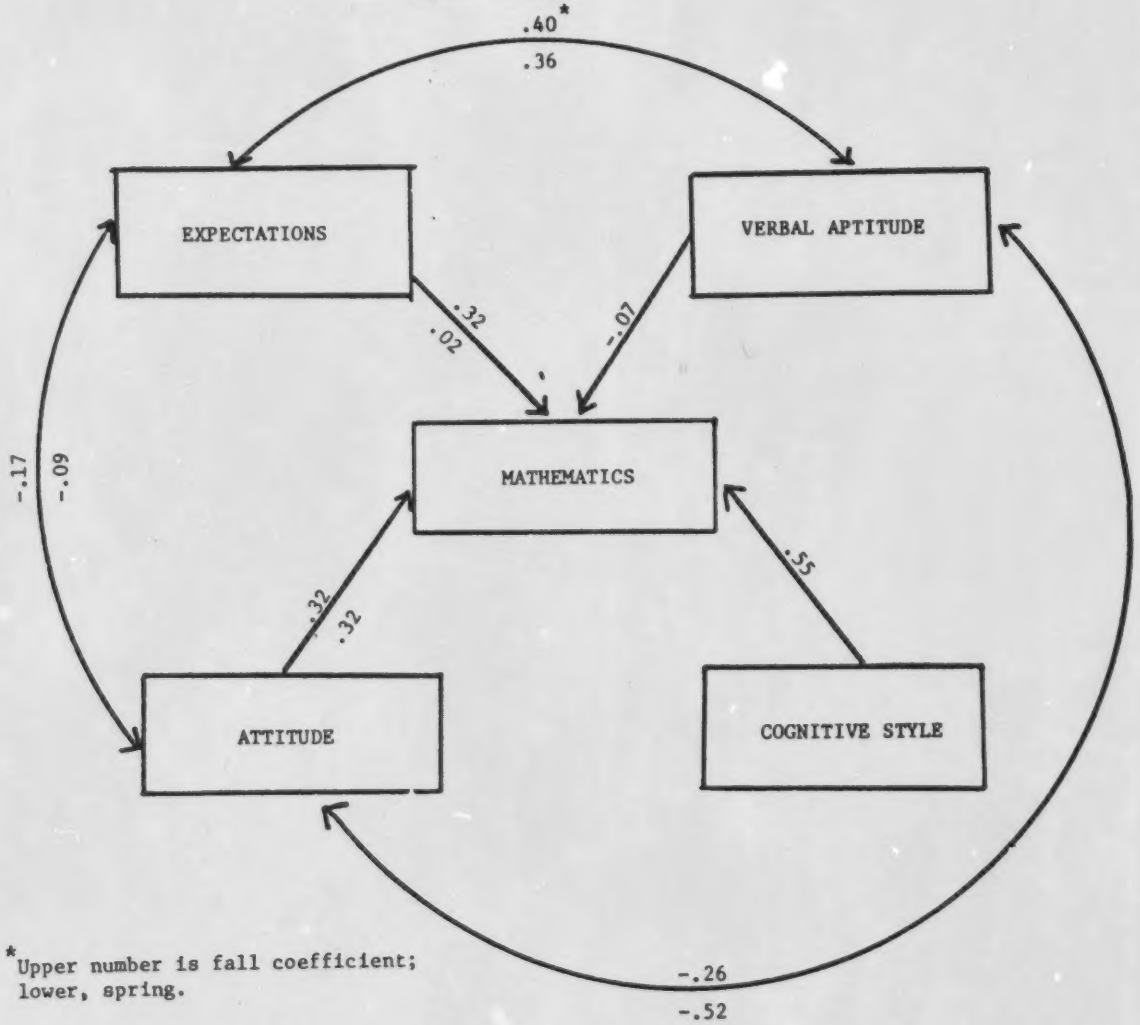
For Grade 2 Mathematics - Attitudes Towards Mathematics (Fall and Spring), Expectations (Fall) and Cognitive Style have significant path coefficients (see Figure 8.18). In general students with higher expectations and more positive attitudes in the fall and who are more field-independent have higher gain scores in mathematics.



*Upper number is fall coefficient; lower, spring

Figure 8.17 Path Model for Student Variables Grade 2 Reading

Figure 8.18 Path Model for Student Variables
Grade 2 Mathematics



*Upper number is fall coefficient; lower, spring.

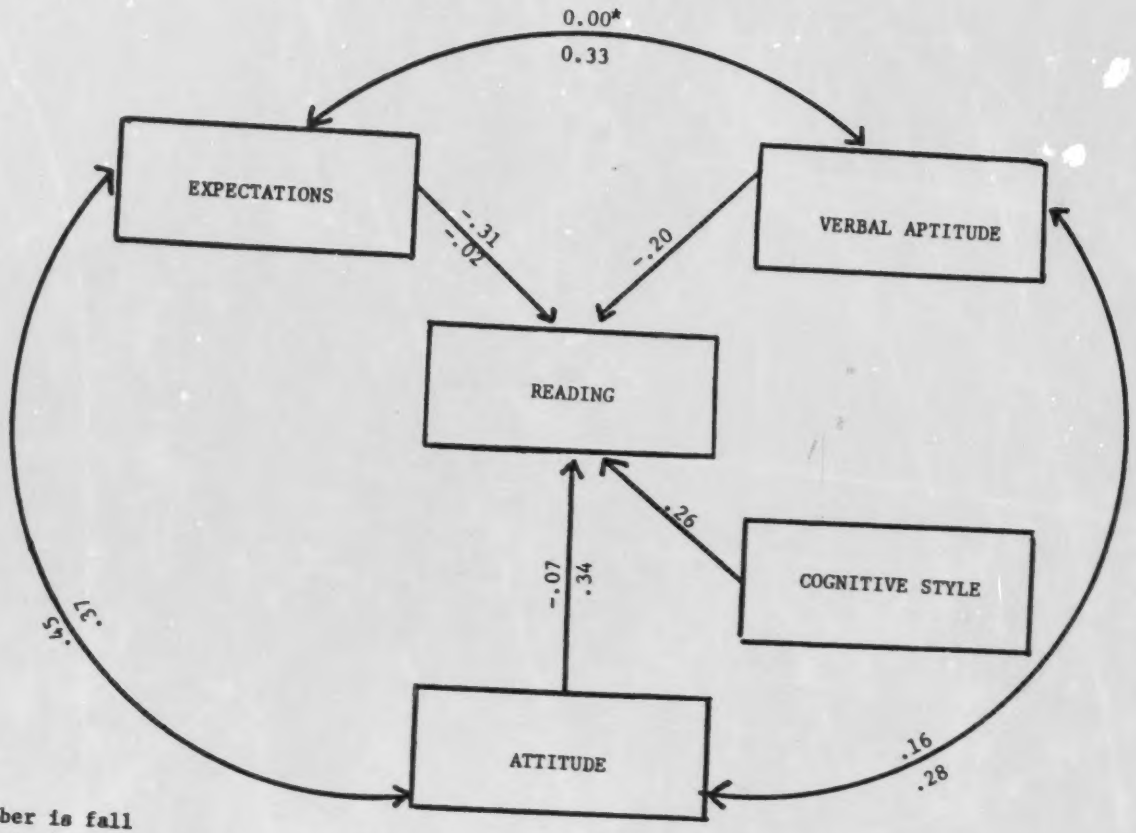
In Figure 8.19 the relation between Expectations - Fall, Attitudes - Spring, and Reading is significant for Grade 5 Reading. Here the relation is negative for Expectations ($p = -.31$).

Figure 8.21 presents the path diagram for Grade 5 Mathematics. Here two path coefficients are significant, Attitudes - Fall ($p = -.45$) and Attitudes - Spring ($p = .43$). Recall that the zero-order correlations of the attitude scores with the mean difference scores were not significant (see Table 8.21). The discrepancy in results is related to the nature of the path coefficients. The path coefficient indicates the relation with its correlations with other variables partialled out, thus showing the independent strength of the relation.

Student Characteristics

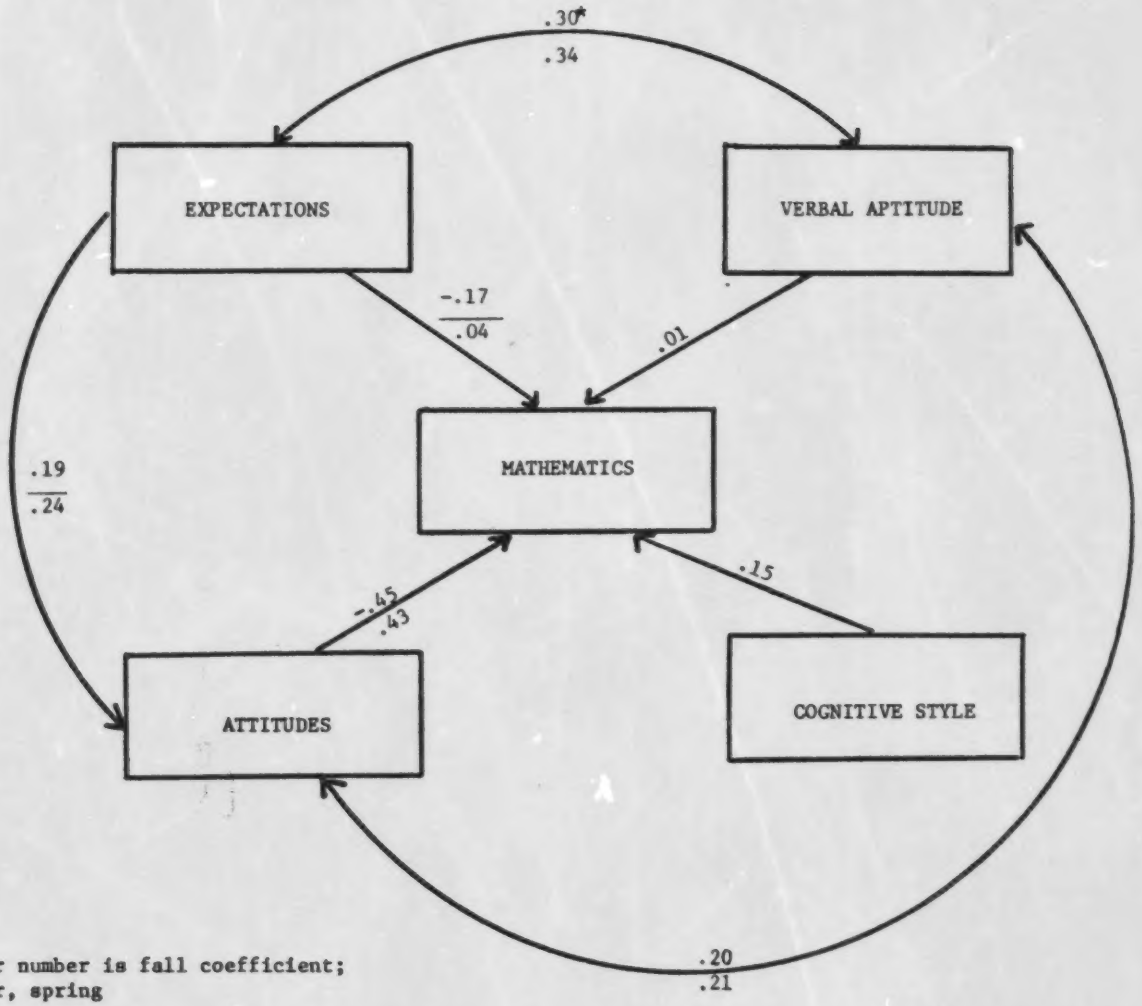
Student characteristics include variables related to the students' sex and race, socioeconomic background, parent's education, preschool experience, reading at home, watching educational television, absence from school, and number of schools attended. Two sources were used to obtain the relevant data, the Parent Questionnaire and the Pupil Survey. The latter was filled out by the teacher. Table 8.23 gives the symbol for the variable, the source, and the description of the variable.

Table 8.24 gives the correlation of each of these variables with fall and spring total reading and mathematics scores for both Grade 2 and Grade 5. As would be expected, socioeconomic status correlates



*Upper number is fall coefficient; lower, spring

Figure 8.19 Path Model for Student Variables; Grade 5 Reading



*Upper number is fall coefficient; lower, spring

Figure 8.20 Path Model for Student Variables; Grade 5 Mathematics

Table 8.23

Symbol and Description for Student Characteristics Variables

	Symbol & Source*	Description
1.	SEX (PS)	Male or Female
2.	RACE (PS)	Black, Chinese, Filipino, ... White, Other
3.	SES_1 (PS)	Upper to Lower Class
4.	SES_2 (PQ)	Upper to Lower Class
5.	MOTHER'S ED. (PQ)	None to Graduate or Professional Education
6.	FATHER'S ED. (PQ)	None to Graduate or Professional Education
7.	MOTHER'S MATH (PQ)	Number of Courses
8.	FATHER'S MATH (PQ)	Number of Courses
9.	P-ACT (PQ)	Read to Child; Helps with School Work; Other
10.	F-THRU (PQ)	In Follow-Through or Not
11.	HEADS (PQ)	In Head Start or Not
12.	TITLI (PS)	In Title I or Not
13.	BILIN (PS)	In Bilingual Program or Not
14.	REMED (PS)	In Remedial Reading Program or Not
15.	MILUH (PS)	In Miller-Unruh Program or Not
16.	OTHER (PS)	Other Special Program or Not
17.	PRESC (PQ)	In Preschool or Not
18.	EL CO (PQ)	Watches Electric Company or Not
19.	C-REA (PQ)	Reads at Home or Not
20.	ESL2 (PS)	Non-native English Speaking; Native English Speaking
21.	ABST (PS)	Number of Days; Seldom, 1-2, 3-5, 5-10 days/mo.; Other
22.	ATD (PS)	Number of Schools Attended

* PS -- Pupil Survey (completed by teacher)
PQ -- Parent Questionnaire

Table 8.24

Correlation of Student Characteristics with Total Scores

		Grade 2				Grade 5			
		Reading		Mathematics		Reading		Mathematics	
		F	S	F	S	F	S	F	S
1.	SEX	.09	.13	-.03	.02	.09	.08	.06	.06
2.	RACE	.07	.07	.07	.04	.17	.18	.16	.16
3.	SES_1	.44	.46	.38	.33	.36	.38	.32	.32
4.	SES_2	.33	.35	.32	.25	.25	.31	.29	.28
5.	MOTHER'S ED.	.43	.45	.35	.32	.34	.33	.24	.25
6.	FATHER'S ED.	.43	.46	.37	.36	.32	.36	.28	.29
7.	MOTHER'S MATH	.31	.27	.24	.24	.27	.27	.22	.21
8.	FATHER'S MATH	.34	.36	.33	.35	.29	.32	.23	.25
9.	P-ACT	-.11	-.06	-.08	-.13	-.23	-.23	-.22	-.15
10.	F-THRU	-.10	-.11	-.07	-.04	-.04	-.04	-.06	-.01
11.	HEADS	-.10	-.13	-.09	-.13	-.16	-.18	-.11	-.11
12.	TITLI	-.05	-.05	-.05	-.08	-.10	-.13	-.14	-.15
13.	BILIN	-.10	-.14	-.10	-.09	-.12	-.07	-.01	.01
14.	REMED	-.18	-.22	-.19	-.18	-.13	-.14	-.15	-.14
15.	MILUH	-.19	-.24	-.08	-.20	-.19	-.19	-.19	-.15
16.	OTHER	.07	.05	.06	.08	.10	.17	.09	.12
17.	PRESC	.26	.27	.16	.12	.15	.12	.07	.06
18.	EL CO	.04	.02	.02	-.02	-.08	-.08	-.08	-.08
19.	C-REA	.16	.19	.08	.08	.17	.16	.07	.09
20.	ESL2	-.20	-.20	-.13	-.13	-.18	-.14	-.07	-.05
21.	ABST	-.18	-.21	-.14	-.16	-.13	-.12	-.15	-.12
22.	ATD	-.08	-.07	-.04	-.09	-.02	-.03	-.04	-.04

positively with achievement scores in both fall and spring. (The values for SES_2 are smaller because the range of social class is restricted. SES_2 was obtained from the information provided in the Parent Questionnaire. A 70 percent return was obtained but parents who did not return the questionnaire were usually from lower socioeconomic neighborhoods.) Variables related to socio-economic status are also positively correlated with the scores. The remaining correlations in the table, however, are small.

Another way to analyze the relation of these variables to learning is to regress the set of variables against spring scores partialling out fall scores. The results of this type of analysis are presented in Tables 8.25, 8.26, 8.27, and 8.28.

Note that all F-values are significant. Note also that the student variables previously discussed have been included in this analysis. Each variable taken by itself contributes relatively little to predicting spring scores.

The important datum for interpretation is the "Proportion of Squares" - "Due to Hypothesis." This value gives the proportion of variance accounted for by the set of variables. These values are listed below:

	GRADE 2	GRADE 5
READING	.24	.23
MATHEMATICS	.24	.32

Table 8.25

Regression of Student Characteristics and Student Variables on Spring Scores with Fall Scores as the Concomitant Variable; Grade 2 Reading

THE DEPENDENT VARIABLE IS TOT-RD-S. THE MULTIPLE CORRELATION IS 0.4878. THE STANDARD ERROR OF ESTIMATE= 0.0237

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		500.			
UNDER NULL HYPOTHESIS	0.3468	1.0000	499.			
DUE TO HYPOTHESIS	0.0825	0.2379	28.	0.0029	5.2521	0.0000
ERROR	0.2643	0.7621	471.	0.0006		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 471.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOT-RD-F		0.5450	0.0346	15.7475		0.5315
INDEPENDENT VARIABLES						
SEX---PS	0.0993	0.0587	0.0250	2.3450	-0.0089	0.0977
RACE--PS	-0.0470	-0.0278	0.0257	-1.0792	-0.0019	0.1484
SES---PS	-0.0160	-0.0105	0.0355	-0.2951	-0.0001	0.4492
SES---PQ	0.0283	0.0177	0.0338	0.5223	-0.0004	0.4471
M-ED--PQ	0.0970	0.0633	0.0404	1.5665	-0.0040	0.5776
F-ED--PQ	0.0736	0.0479	0.0453	1.0572	-0.0018	0.6661
MMATH-PQ	-0.1479	-0.0916	0.0324	-2.9248	-0.0129	0.4094
FMATH-PQ	0.0743	0.0465	0.0340	1.3686	-0.0030	0.4506
P-ACT-PQ	0.0333	0.0197	0.0248	0.7950	-0.0010	0.0798
FTHRU-PQ	0.0164	0.0097	0.0257	0.3773	-0.0002	0.1433
HEADS-PQ	-0.0386	-0.0229	0.0264	-0.8663	-0.0012	0.1867
TITLI-PS	0.0145	0.0086	0.0243	0.3520	-0.0002	0.0468
BILIN-PS	-0.0593	-0.0351	0.0248	-1.4130	-0.0032	0.0807
RcMED-PS	-0.0940	-0.0562	0.0259	-2.1729	-0.0076	0.1346
MILUH-PS	-0.1638	-0.0983	0.0260	-3.7861	-0.0232	0.1351
OTHER-PS	-0.0436	-0.0257	0.0255	-1.0064	-0.0016	0.1362
PRESC-PQ	0.0316	0.0192	0.0270	0.7133	-0.0008	0.1747
EL.CO-PQ	-0.0143	-0.0084	0.0245	-0.3434	-0.0002	0.0636
C-REA-PQ	0.0517	0.0308	0.0258	1.1953	-0.0023	0.1336
E-L2-AGB	0.0351	0.0211	0.0270	0.7809	-0.0010	0.1978
ADST-AGB	-0.0714	-0.0428	0.0257	-1.6663	-0.0045	0.1195
S-ATD-PS	-0.0355	-0.0210	0.0244	-0.8611	-0.0012	0.0476
S-EXP--F	0.0489	0.0312	0.0278	1.1231	-0.0020	0.1454
S-EXP--S	0.1461	0.0946	0.0285	3.3211	-0.0178	0.1634
S-ATT--F	-0.0121	-0.0072	0.0267	-0.2686	-0.0001	0.2036
S-ATT--S	0.0482	0.0287	0.0281	1.0230	-0.0017	0.2714
SFIAA	0.2013	0.1479	0.0353	4.1944	-0.0285	0.2975
COGSYTLE	0.1240	0.0801	0.0289	2.7739	-0.0124	0.1908

Table 8.26

Regression of Student Characteristics and Student Variables on Spring Scores with Fall Scores as the Concomitant Variable; Grade 2 Mathematics

THE DEPENDENT VARIABLE IS MTOTAL-S. THE MULTIPLE CORRELATION IS 0.4918. THE STANDARD ERROR OF ESTIMATE 0.0315

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		500.			
UNDER NULL HYPOTHESIS	0.6150	1.0000	499.			
DUE TO HYPOTHESIS	0.1488	0.2419	28.	0.0053	5.3666	0.0000
ERROR	0.4663	0.7581	471.	0.0010		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 471.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
MTOTAL-F		0.2977	0.0469	6.3474		0.5560
INDEPENDENT VARIABLES						
SEX---PS	0.0528	0.0414	0.0333	1.2442	-0.0025	0.1055
RACE--PS	-0.0811	-0.0638	0.0348	-1.8322	-0.0054	0.1782
SES---PS	0.0194	0.0165	0.0457	0.3615	-0.0002	0.4437
SES---PQ	-0.0460	-0.0380	0.0454	-0.8386	-0.0011	0.4644
P-ED--PQ	0.0597	0.0499	0.0538	0.9276	-0.0014	0.6109
F-ED--PQ	0.1010	0.0854	0.0586	1.4569	-0.0034	0.6650
PMATH-PQ	-0.0195	-0.0158	0.0432	-0.3655	-0.0002	0.4373
FMATH-PQ	0.0830	0.0690	0.0454	1.5196	-0.0037	0.4607
P-ACT-PQ	-0.1040	-0.0819	0.0326	-2.5090	-0.0101	0.0636
FTHRU-PQ	0.0559	0.0440	0.0341	1.2917	-0.0027	0.1415
HEADS-PQ	-0.0245	-0.0193	0.0347	-0.5566	-0.0005	0.1722
TITLI-PS	-0.0135	-0.0106	0.0327	-0.3251	-0.0002	0.0730
BILIN-PS	-0.0071	-0.0056	0.0330	-0.1700	-0.0000	0.0814
REMED-PS	-0.0398	-0.0310	0.0344	-0.9017	-0.0013	0.1316
MILUH-PS	-0.1503	-0.1183	0.0335	-3.5314	-0.0201	0.1116
OTHER-PS	0.0305	0.0240	0.0347	0.6904	-0.0008	0.1752
PRESC-PQ	-0.0485	-0.0385	0.0356	-1.0832	-0.0019	0.1981
EL.CO-PQ	-0.0282	-0.0221	0.0326	-0.6787	-0.0007	0.0696
C-REA-PQ	-0.0014	-0.0011	0.0337	-0.0315	-0.0000	0.1242
E-L2-AGB	-0.0045	-0.0035	0.0370	-0.0958	-0.0000	0.2656
ABST-AGB	-0.0583	-0.0462	0.0337	-1.3700	-0.0030	0.1103
S-ATD-PS	-0.0525	-0.0412	0.0324	-1.2745	-0.0026	0.0527
S-EXP--F	0.0755	0.0666	0.0370	1.7994	-0.0052	0.0869
S-EXP--S	0.1594	0.1323	0.0354	3.7350	-0.0225	0.1165
S-ATT--F	0.0786	0.0618	0.0354	1.7452	-0.0049	0.2065
S-ATT--S	-0.0137	-0.0108	0.0368	-0.2929	-0.0001	0.2599
SFTAA	0.1388	0.1439	0.0505	2.8513	-0.0131	0.3203
COGSYTLE	0.2005	0.1802	0.0390	4.6254	-0.0344	0.1436

Table 8.27

Regression of Student Characteristics and Student Variables on Spring Scores with Fall Scores as the Concomitant Variable; Grade 5 Reading

THE DEPENDENT VARIABLE IS TOT-RD-S. THE MULTIPLE CORRELATION IS 0.4771. THE STANDARD ERROR OF ESTIMATE= 0.0160

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		1000.			
UNDER NULL HYPOTHESIS	0.3219	1.0000	999.			
DUE TO HYPOTHESIS	0.0733	0.2276	28.	0.0026	10.2194	0.0
ERROR	0.2486	0.7724	971.	0.0003		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 971 D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOT-RD-F		0.4855	0.0305	15.9115		0.7250
INDEPENDENT VARIABLES						
SEX---PS	0.0782	0.0446	0.0166	2.6938	-0.0058	0.0570
RACE--PS	0.0011	0.0006	0.0181	0.0349	-0.0000	0.1942
SES---PS	-0.0282	-0.0172	0.0218	-0.7880	-0.0005	0.3806
SES---PQ	0.0696	0.0408	0.0226	1.8085	-0.0026	0.4636
M-ED--PQ	-0.0460	-0.0277	0.0262	-1.0588	-0.0009	0.5784
F-ED--PQ	0.0753	0.0450	0.0289	1.5569	-0.0019	0.6601
MMATH-PQ	0.0046	0.0027	0.0209	0.1299	-0.0000	0.3678
FMATH-PQ	0.0314	0.0186	0.0218	0.8541	-0.0006	0.4110
P-ACT-PQ	-0.0574	-0.0334	0.0173	-1.9327	-0.0030	0.0967
FTHRU-PQ	-0.0006	-0.0003	0.0164	-0.0198	-0.0000	0.0498
HEADS-PQ	-0.0271	-0.0156	0.0176	-0.8879	-0.0006	0.1485
TITLI-PS	0.0288	-0.0164	0.0171	-0.9567	-0.0007	0.1195
BILIN-PS	0.0079	0.0045	0.0169	0.2656	-0.0001	0.0902
REMED-PS	-0.0434	-0.0249	0.0166	-1.4942	-0.0018	0.0583
MILUH-PS	-0.0466	-0.0269	0.0169	-1.5765	-0.0020	0.0663
OTHER-PS	0.1411	0.0805	0.0169	4.7517	-0.0180	0.0984
PRESC-PQ	-0.0391	-0.0224	0.0178	-1.2594	-0.0013	0.1750
EL.CO-PQ	0.0102	0.0058	0.0168	0.3450	-0.0001	0.0823
C-REA-PQ	0.0401	0.0231	0.0168	1.3773	-0.0015	0.0633
E-L2-AEB	0.0502	0.0290	0.0176	1.6419	-0.0021	0.1505
ABST-AEB	0.0149	0.0085	0.0167	0.5103	-0.0002	0.0619
S-ATD-PS	-0.0329	-0.0187	0.0164	-1.1406	-0.0010	0.0443
S-EXP--F	0.0189	0.0110	0.0195	0.5633	-0.0003	0.2901
S-EXP--S	0.1319	0.0772	0.0182	4.2416	-0.0143	0.1777
S-ATT--F	-0.0551	-0.0321	0.0224	-1.4316	-0.0016	0.4631
S-ATT--S	0.1301	0.0775	0.0222	3.4892	-0.0097	0.4276
SFTAA	0.2406	0.2452	0.0317	7.7370	-0.0476	0.1776
COGSYTLE	0.1359	0.0883	0.0198	4.4645	-0.0159	0.1411

Table 8.28

Regression of Student Characteristics and Student Variables on Spring Scores with Fall Scores as the Concomitant Variable; Grade 5 Mathematics

THE DEPENDENT VARIABLE IS MTOTAL-S. THE MULTIPLE CORRELATION IS 0.5662. THE STANDARD ERROR OF ESTIMATE= 0.0195

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		1000.			
UNDER NULL HYPOTHESIS	0.4904	1.0000	999.			
DUE TO HYPOTHESIS	0.1572	0.3206	28.	0.0056	16.3612	0.0
ERROR	0.3332	0.6794	971.	0.0003		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 971.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
MTOTAL-F		0.3538	0.0291	12.1362		0.5962
INDEPENDENT VARIABLES						
SEX---PS	0.0311	0.0219	0.0191	1.1469	-0.0009	0.0514
RACE--PS	0.0180	0.0128	0.0208	0.6137	-0.0003	0.1097
SES---PS	-0.0555	-0.0409	0.0252	-1.6231	-0.0018	0.4005
SES---PQ	0.0053	0.0038	0.0262	0.1469	-0.0000	0.4525
M-ED--PQ	0.0645	0.0465	0.0300	1.5506	-0.0017	0.5751
F-ED--PQ	0.0110	0.0080	0.0337	0.2391	-0.0000	0.6716
MMATH-PQ	-0.0322	-0.0231	0.0242	-0.9519	-0.0006	0.3969
FMATH-PQ	0.0209	0.0150	0.0250	0.6020	-0.0003	0.4184
M-ACT-PQ	0.0381	0.0273	0.0200	1.3674	-0.0013	0.0969
FTHRU-PQ	0.0398	0.0279	0.0191	1.4645	-0.0015	0.0330
READS-PQ	0.0147	0.0104	0.0203	0.5108	-0.0002	0.1562
TITLI-PS	-0.0216	-0.0153	0.0204	-0.7487	-0.0004	0.1605
BILIN-PS	-0.0023	-0.0016	0.0192	-0.0836	-0.0000	0.0711
REMED-PS	-0.0173	-0.0122	0.0196	-0.6251	-0.0003	0.0832
MILUH-PS	0.0010	0.0007	0.0196	0.0373	-0.0000	0.0725
OTHER-PS	0.0641	0.0451	0.0194	2.3287	-0.0038	0.0775
PRESC-PQ	-0.0391	-0.0274	0.0203	-1.3523	-0.0013	0.1671
EL.CO-PQ	-0.0301	-0.0212	0.0193	-1.0979	-0.0008	0.0704
C-REA-PQ	0.0239	0.0168	0.0191	0.8757	-0.0005	0.0533
E-L2-A6B	0.0467	0.0328	0.0205	1.5987	-0.0018	0.1783
ABST-A6B	-0.0064	-0.0045	0.0193	-0.2351	-0.0000	0.0524
S-ATD-PS	-0.0209	-0.0147	0.0189	-0.7753	-0.0004	0.0400
S-EXP--F	-0.0513	-0.0383	0.0232	-1.6544	-0.0019	0.2716
S-EXP--S	0.3716	0.2709	0.0215	12.6273	-0.1116	0.1918
S-ATT--F	-0.0563	-0.0409	0.0262	-1.5618	-0.0017	0.4625
S-ATT--S	0.1122	0.0831	0.0264	3.1453	-0.0069	0.4500
SFTAA	0.2687	0.2719	0.0294	9.2424	-0.0598	0.1721
COGSYTLE	0.1431	0.1158	0.0230	5.0233	-0.0177	0.1383

The next step in the analysis is to perform a stepwise regression entering the variables one at a time beginning with the variable with the largest R-SQ value. The purpose of this analysis was to see the contribution of each variable as it was stepped into the regression analysis. A preliminary run using EXP-S as the first variable indicated that this variable accounted for nine percent of the variance. The addition of SES_1 accounted for 11 percent of the variance. As additional variables were entered one at a time, the percent of variance accounted for increased by one or two units successively. The analysis was not continued because the pattern of information being produced was obvious.

Thus, all of the student variables account for 22 to 32 percent of the variance in spring scores with the fall scores used as the concomitant variable (see Tables 8.25 - 8.28). Of the total variance, about 10 to 15 percent is accounted for by EXP-S and SES_1 whose intercorrelations are low (0 to .25).

A Comparison of the Characteristics of the Top and Bottom Ten Classes

An obvious question is whether classes in the top and bottom ten as they were sorted by using the b and c distribution differ in some significant way in terms of student characteristics. The discussion in the preceding section suggests that such differences are not likely to be significant; however, in this section we add some additional information to support this point.

Tables 8.29 and 8.30 list the major characteristics of the classes in the top and bottom 10 for both Reading and Mathematics and for Grades 2 and 5. As can be seen the groups do not differ in any meaningful way. There is a slight tendency for the average SES of the lower ten to be lower (3 = middle class; 4 = lower-middle class; a lower number indicates a higher SES index). The slight difference in mean arises because there are one or two more classes in the bottom ten which are lower-middle class. Generally, the two groups are a middle to lower-middle class group.

Are the classes concentrated in a few districts or schools? This question can be answered by posing and answering the following questions:

1. How many of the teachers in the upper ten were in the same district?
2. How many teachers in the upper ten were in the same school?
3. How many teachers in the lower ten were in the same district?
4. How many teachers in the lower ten were in the same school?
5. How many of the teachers in the upper ten and lower ten were in the same district?
6. How many of the teachers in the upper ten and lower ten were in the same school?

The data relevant to these questions are summarized below:

Table 8.29

Teacher and Class Characterisitcs for Upper and Lower 10 Classes; Grade 2

	Reading		Mathematics	
	Upper 10	Lower 10	Upper 10	Lower 10
Teacher - Sex				
M	0	2	0	1
F	10	8	10	9
Teacher - Age				
21 - 40	4	6	4	6
41 - 60	6	4	6	4
Teacher - Highest Degree				
Bachelor's	9	7	7	5
Master's	1	3	3	5
Locale				
Urban	5	5	3	6
Suburban	3	4	4	3
Rural	2	1	3	1
Class - Ethnic Majority				
White	6	4	7	7
Black	0	0	0	0
Mexican American	1	1	0	1
Oriental	0	1	0	0
Mixed	3	4	3	2
Class - SES				
Mean	2.9	3.6	3.1	3.3
Class - Grade Composition				
Single	6	6	6	6
Multi-grade	4	4	4	4

Table 8.30

Teacher and Class Characteristics for Upper and Lower 10 Classes; Grade 5

	Reading		Mathematics	
	Upper 10	Lower 10	Upper 10	Lower 10
Teacher-Sex				
M	3	3	6	3
F	7	7	4	7
Teacher - Age				
21-40	5	5	4	3
41-60	5	5	6	7
Teacher - Highest Degree				
Bachelor's	6	8	7	9
Master's	4	2	3	1
Locale				
Urban	6	1	5	4
Suburban	4	5	2	2
Rural	0	4	3	4
Class - Ethnic Majority				
White	6	8	7	6
Black	0	0	1	1
Mexican-American	1	0	0	0
Oriental	0	0	0	0
Mixed	3	2	2	3
Class - SES				
Mean	2.9	3.1	3.0	3.3
Class - Grade Composition				
Single	5	8	6	10
Multi-grade	5	2	4	0

Grade 2

	Reading		Mathematics	
	Upper 10	Lower 10	Upper 10	Lower 10
No. of Different Districts	6	5	6	6
No. of Different Schools	10	10	10	7
No. of Districts in Both U & L	4		4	
No. of Schools in Both U & L	2		0	

Grade 5

	Reading		Mathematics	
	Upper 10	Lower 10	Upper 10	Lower 10
No. of Different Districts	7	5	6	7
No. of Different Schools	9	10	10	10
No. of Districts in Both U & L	3		3	
No. of Schools in Both U & L	1		0	

As can be seen from this table, for second-grade reading there are six different districts represented among the upper ten teachers, hence there are some of those teachers in the same district. There is one teacher in each of three districts, two teachers in each of two districts, and three teachers in one district. But each teacher is in a different school.

Among the lower ten teachers, five different districts are represented. There is one teacher in each of two districts, two teachers in each of two districts, and four teachers in one district. Again all these teachers are in different schools.

Four districts had teachers in the upper and lower ten. Two schools had a teacher in the upper ten and one in the lower ten.

In second-grade mathematics, six different districts are represented in the upper ten teachers. One teacher was in each of three districts; two teachers were in each of two districts; and three teachers were in one district. None of these teachers are in the same school.

Among the lower ten teachers, six districts are represented. One teacher is in each of three districts; two teachers are in each of two districts; and three teachers are in one district. These teachers are in seven different schools. Four districts have teachers in the upper and lower ten. But no school has a teacher both in the upper and lower ten.

For fifth-grade reading, seven districts are represented in the upper ten. There is one teacher in each of five districts; two teachers in one district, and three teachers in one district. All but one pair of these teachers are in different schools.

Among the lower ten in fifth-grade reading, five districts are represented. One teacher is in each of three districts; three teachers are in one district, and four teachers in another district. None of these teachers were in the same school.

Three districts had teachers both in the upper and lower ten. One school had a teacher both in the upper and lower ten.

For fifth-grade mathematics, six districts are represented in the upper ten. There is one teacher in each of two districts, and two teachers in each of four districts. All are in different schools.

Among the lower ten in fifth-grade mathematics, seven districts are represented. There is one teacher in each of five districts, two teachers in one district, and three teachers in one district. None of these teachers were in the same school.

Three districts had teachers both in the upper and lower ten. No school had a teacher both in the upper and lower ten.

At the second grade, five districts had teachers in the upper ten both in reading and mathematics. Four schools had teachers in the upper ten both in reading and mathematics.

At the second grade, four districts had teachers in the lower ten both in reading and mathematics. Two schools had teachers in the lower ten both in reading and mathematics.

At the fifth grade, four districts were represented in the upper ten both in reading and mathematics. Four schools had teachers in the upper ten both in reading and mathematics.

At the fifth grade, four districts were represented in the lower ten both in reading and mathematics. Four schools had teachers in the lower ten both in reading and mathematics.

Second Grade

Reading and Mathematics

	Upper 10	Lower 10
No. of Districts Represented	5	4
No. of Schools Represented	4	2

Fifth Grade

Reading and Mathematics

	Upper 10	Lower 10
No. of Districts Represented	4	4
No. of Schools Represented	4	4

These data show how many districts and schools are represented in the top and bottom ten classes in both Reading and Mathematics at Grades 2 and 5. There obviously is no relation of position in top and bottom to teacher location in a particular school or district. Across both subjects and grade levels all of the 11 districts have at least one class in the top ten; nine of the 11 districts also have classes in the bottom ten. (For this discussion each of the four Los Angeles "areas" represented in the study was considered a separate district; there were seven districts plus the four "areas".)

Summary of The Differences in Students' Performance by Classes

The purpose of this chapter was threefold; first, to display the patterns of performance among the classes; second, to estimate what proportion of the variance in spring scores is attributable to fall scores

and to characteristics of the students; and third, to describe which teaching performances account for differences in the patterns of differences. The following points summarize the data analysis thus far:

1. At both grade levels in both subjects across all classes, there is a very high positive correlation between fall and spring scores.
2. Fall scores account for 64 to 74 percent of the variance in spring scores.
3. The classes differed from each other in mean difference and rate of change. In general the pattern had three components: (1) a group in which the rate of change was relatively constant for all students in the class and the mean difference between fall and spring scores was substantial; (2) a group in which the rate of change was substantial for students at the high end of the score range but the mean difference in fall and spring scores was small; and (3) an intermediate group in which there were positive changes proportional to the student's fall score location.
4. Student characteristics account for a relatively small portion of the variance in spring scores when fall scores are used as a concomitant variable approximately 20 to 30 percent.
5. When the upper and lower ten classes are sorted in terms of their differences in fall and spring scores and rates of change are considered jointly, the classes so sorted do not differ in terms of major teacher and student characteristics.

A reasonable conclusion from these analyses is that what students have learned as measured by fall achievement tests is strongly related to their final scores. A relatively small portion of the variance in

these final scores is accounted for by the variance in student characteristics. But there are notable differences across classes in the pattern of differences from fall to spring.

The next questions are, are some of these differences accounted for by teaching performance and if so, are the teaching performances related to the pattern of differences?

These questions are addressed in the following section.

Teaching Performances that Discriminate Teachers whose Classes Have Different Patterns of Mean Differences

In Chapter 7 we looked at teaching performances that predict residual or mean difference scores. In this secion we look at the same data from a different point of view.

In this chapter we looked at patterns of mean differences. To study these patterns we plotted each classes' slope (b) and intercept (c) with respect to a slope-intercept set of axes. When we did this plotting, we observed a cluster of classes with small slopes and large intercepts and another cluster of classes with large slopes and small intercepts. The remainder of the classes had slopes about = 1.00 and positive intercepts. We presented the data that support the argument that such differences were not related solely to differences in the aptitude or the socioeconomic background of the students.

In this section we answer the question, are teaching performances related to the differences in these patterns? The reader should recall that we have found that teaching performances were related to mean

difference scores. We are now asking if these performances are related to the cluster in which the class falls. Actually we know from the previous analyses that the performances are so related; if they were not we would not have obtained significant R's in the analyses of mean difference scores. The analysis presented here simply sharpens that picture.

We assigned a score of +1 to the ten classes in the top cluster. We assigned a score of -1 to the bottom cluster of classes and a 0 to the group in the middle. Thus each classes' scores mark where that class fell in terms of the b x c plot. It should be noted that by restricting the range of scores on the dependent variable we are decreasing the likelihood of obtaining significant R's.

Reading - Grade 2

Table 8.31 presents the multiple regression of the group scores on teaching performances. As can be seen, the R is highly significant; $R = .99$ ($p < .0001$). The performance variables account for all of the differences in the scores.

To interpret these data we asked what would a teacher probably look like who had high scores or positive predictors as opposed to a teacher who had low scores or negative predictors. Obviously teachers may have a mixture of high and low scores on the two kinds of predictors or high scores on both kinds of predictors. We are assuming that such patterns of scores would fall somewhere in the middle.

Table 8.31

Multiple Regression of Group Scores on Teaching Performances
Grade 2 Reading (N = 33)

THE DEPENDENT VARIABLE IS GROUPVAR, THE MULTIPLE CORRELATION IS 0.9959, THE STANDARD ERROR OF ESTIMATE= 0.0285

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		33.			
UNDER NULL HYPOTHESIS	1.0000	1.0000	33.			
DUE TO HYPOTHESIS	0.9919	0.9919	23.	0.0431	53.2566	0.0000
ERROR	0.0081	0.0081	10.	0.0008		

INDEPENDENT VARIABLES	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 10.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
WD-----1	-1.4986	-1.4986	0.1099	-13.6373	-0.1506	0.9329
WD-----2	-0.9060	-0.9060	0.0722	-12.5467	-0.1275	0.8447
WD-----3	-0.4202	-0.4202	0.0524	-8.0132	-0.0520	0.7055
WD-----4	0.2736	0.2736	0.0614	4.4555	-0.0161	0.7853
WD-----5	1.3597	1.3597	0.0764	17.8003	-0.2566	0.8612
RAM----1	-0.6068	-0.6068	0.0795	-7.6292	-0.0471	0.8720
RAM----2	-0.1095	-0.1095	0.0877	-1.2481	-0.0013	0.8947
RAM----3	0.7586	0.7586	0.0646	11.7464	-0.1117	0.8058
RAM----4	0.1267	0.1267	0.0578	2.1904	-0.0039	0.7580
APPLE--1	0.3960	0.3960	0.0567	6.9874	-0.0395	0.7479
APPLE--2	-0.5140	-0.5140	0.0599	-8.5848	-0.0597	0.7741
APPLE--3	0.4785	0.4785	0.1118	4.2793	-0.0148	0.9352
APPLE--4	0.0388	0.0388	0.0603	0.6436	-0.0003	0.7774
APPLE--5	0.1958	0.1958	0.0510	3.8376	-0.0119	0.6891
APPLE--6	-0.6709	-0.6709	0.0857	-7.8268	-0.0496	0.8898
APPLE--7	-0.5401	-0.5401	0.0906	-5.9588	-0.0288	0.9014
APPLE--8	-0.3064	-0.3064	0.0450	-6.8139	-0.0376	0.5996
APPLE--9	-0.4457	-0.4457	0.1001	-4.4504	-0.0160	0.9193
APPLE-10	0.7079	0.7079	0.0785	9.0184	-0.0659	0.8686
APPLE-11	0.1542	0.1542	0.0602	2.5602	-0.0053	0.7769
APPLE-12	-1.0616	-1.0616	0.0895	-11.8670	-0.1140	0.8988
APPLE-13	0.7057	0.7057	0.0867	8.1385	-0.0536	0.8923
APPLE-14	0.1894	0.1894	0.0560	3.3826	-0.0093	0.7417

WD-5 (variety of instructional materials) has a significant positive regression weight as does R-3 (also variety of materials used), WD-4 (variety of instructional contexts), R-4 (supervised independent seatwork), AP-1 (pupil productivity), AP-3 (attentiveness), AP-5 (independent pupil work), AP-10 (developing pupil understanding), AP-11 (teacher mobility), AP-13 (social control), and AP-14 (nonresponsiveness to pupils). AP-1 (pupil productivity) and AP-3 (attentiveness) reflect task-orientation. The major teaching activity is developing pupil understanding (AP-10).

Thus the teachers in the top group are teachers who use independent pupil work (AP-5, R-4), use a variety of instructional contexts (WD-4), work to develop pupil understanding (AP-10), and maintain task-orientation with social control techniques that do not interrupt the instructional process (AP-13, AP-14). These teachers also use a variety of instructional materials (WD-5, R-3).

The negative predictors provide a picture of the teaching performances in the lower group. These performances are WD-1 and R-1 (teaching time), AP-6 (teacher-directed group work) and AP-2 (inattentive pupil behavior) which suggest a picture of grouping in which, as the teachers work with the group, pupils in other groups or working independently are inattentive--off-task. They tend to use more whole-class instruction (AP-7), spend more time organizing for instruction (AP-8), try to teach a greater variety of skills during the instructional period (WD-2), have better conceptualizations of instructional design (WD-3) and spend instructional time in brief interchanges with pupils (AP-9, AP-12).

The appearance of WD-3 (complexity of conceptualization of instructional design) as a negative predictor may surprise some readers. But in interpreting this result, the tendency to treat these variables as independent should be avoided. It should also be remembered that this measure was derived from how the teacher said instruction had been or was to be organized; it was not derived from observation of the instruction. It would not be surprising if the concept and the performance were different.

But what probably are better interpretations relate to WD-3's correlations with other variables. WD-3 and WD-5 (variety of materials) are substantially correlated, particularly for these performance variables: $r = .43$. In the plane-fitting process, WD-3 may turn out to have a negative residual because of its substantial correlation with WD-4.

Another interpretation is suggested by its other correlations: with R-1 (time-spent in instructional roles), $r = .22$; with R-4 (supervised independent seatwork), $r = .20$; with AP-3 (attentiveness), $r = -.45$; with AP-6 (teacher-group), $r = -.21$; with AP-8 (organizing), $r = -.28$; with AP-11 (teacher mobility), $r = -.31$. These correlations suggest that a teacher with high scores on WD-3 uses independent work (R-4) little group work (AP-6); spends less time organizing and and facilitating (AP-8); and moves around less (AP-11). The negative correlation with AP-3 (attentiveness) suggests low task-orientation. Thus some teachers with high WD-3 scores have conceptualized instruction as independent work, but we suspect that they supervise and manage it poorly.

The stepwise regression sharpens this picture. These results are presented in Table 8.32. $R = .96$ ($p < .0001$) and $R^2 = .92$. AP-3, AP-11, R-4 and AP-13 are now not contributing to the prediction as positive predictors. AP-7 and R-2 are no longer significant negative predictors. After 15 steps, changes of this kind are not surprising. The picture is essentially unchanged.

Mathematics - Grade 2

Table 8.33 presents the results of the multiple regression of group scores on teaching performances. Even though R is large, it is not significant.

Table 8.34 presents the stepwise regression of group scores on teaching performances. R-4 (supervised independent seatwork), WD-3 (quality of the conceptualization of the instructional design), and AP-11 (teacher mobility) are positive predictors. This picture is one that suggests more teaching of pupils as they work individually.

WD-2 (range of content taught) as a negative predictor is surprising since it usually appears as a positive predictor. It has small and non-significant correlations with the positive predictors; R-4, $r = .11$, WD-3, $r = .17$, and AP-11, $r = .25$. The plane-fitting process may account for WD-2's negative sign. Or, it may be that covering more content is generally a positive predictor, but is not a distinguishing character of the teachers in the top group.

Table 8.32

Stepwise Regression of Group Scores on Teaching Performance (Step 16)
Grade 2 Reading (N = 33)

THE DEPENDENT VARIABLE IS GROUPVAR, THE MULTIPLE CORRELATION IS 0.9600, THE STANDARD ERROR OF ESTIMATE= 0.0700

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		32.			
UNDER NULL HYPOTHESIS	1.0000	1.0000	32.			
DUE TO HYPOTHESIS	0.9215	0.9215	16.	0.0576	11.7411	0.0000
ERROR	0.0785	0.0785	16.	0.0049		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 16.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
INDEPENDENT VARIABLES						
APPLE--1	0.2217	0.2217	0.1025	2.1626	-0.0229	0.5331
APPLE--9	0.0373	0.0373	0.0950	0.3929	-0.0008	0.4559
RAM----1	-0.4756	-0.4756	0.1127	-4.2182	-0.0873	0.6140
WD-----5	1.0353	1.0353	0.1190	8.7013	-0.3714	0.6535
WD-----1	-0.9412	-0.9412	0.1199	-7.8508	-0.3023	0.6587
WD-----3	-0.5693	-0.5693	0.0996	-5.7154	-0.1602	0.5057
RAM----3	0.5455	0.5455	0.0898	6.0748	-0.1810	0.3917
APPLE-12	-0.5559	-0.5559	0.1103	-5.0392	-0.1246	0.5969
APPLE-10	0.4831	0.4831	0.1168	4.1347	-0.0839	0.6406
APPLE--8	-0.3492	-0.3492	0.0966	-3.6134	-0.0640	0.4746
APPLE-14	0.2785	0.2785	0.1017	2.7394	-0.0368	0.5256
WD-----2	-0.4382	-0.4382	0.1041	-4.2079	-0.0869	0.5477
APPLE--6	-0.2737	-0.2737	0.1101	-2.4852	-0.0303	0.5955
APPLE--2	-0.3619	-0.3619	0.1206	-3.0013	-0.0442	0.6626
WD-----4	0.2957	0.2957	0.1129	2.6180	-0.0336	0.6154
APPLE--5	0.1790	0.1790	0.0889	2.0139	-0.0199	0.3790
OTHER VARIABLES				NOW 15.D.F.		
APPLE--4	0.1014	0.1014	0.1170	0.8667	0.0037	0.6359
APPLE--3	0.0976	0.0976	0.1991	0.4900	0.0012	0.8701
RAM----4	-0.0464	-0.0464	0.1175	-0.3949	0.0008	0.6252
APPLE-11	-0.0420	-0.0420	0.1056	-0.3980	0.0008	0.5360
RAM----2	-0.0807	-0.0807	0.1571	-0.5137	0.0014	0.7918
APPLE-13	0.2567	0.2567	0.0973	2.6388	0.0249	0.6224
APPLE--7	0.0096	0.0096	0.1122	0.0853	0.0000	0.5848

Table 8.33

Multiple Regression of Group Scores on Teaching Performances
Grade 2 Mathematics (N = 37)

THE DEPENDENT VARIABLE IS GROUPVAR, THE MULTIPLE CORRELATION IS 0.7769, THE STANDARD ERROR OF ESTIMATE= 0.1683

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		37.			
UNDER NULL HYPOTHESIS	1.0000	1.0000	37.			
DUE TO HYPOTHESIS	0.6036	0.6036	23.	0.0262	0.9268	0.5777
ERROR	0.3964	0.3964	14.	0.0283		

INDEPENDENT VARIABLES	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 14.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
WD-----1	-0.0921	-0.0921	0.3748	-0.2457	-0.0017	0.7984
WD-----2	-0.6124	-0.6124	0.3065	-1.9977	-0.1130	0.6987
WD-----3	0.4365	0.4365	0.2127	2.0525	-0.1193	0.3741
WD-----4	0.2588	0.2588	0.3341	0.7747	-0.0170	0.7463
WD-----5	-0.2382	-0.2382	0.2433	-0.9788	-0.0271	0.5217
RAM----1	0.4297	0.4297	0.4169	1.0307	-0.0301	0.8371
RAM----2	-0.4207	-0.4207	0.3619	-1.1625	-0.0383	0.7838
RAM----3	-0.1242	-0.1242	0.4548	-0.2732	-0.0021	0.8631
RAM----4	0.3427	0.3427	0.3448	0.9940	-0.0280	0.7618
APPLE--1	0.3164	0.3164	0.3554	0.8902	-0.0224	0.7759
APPLE--2	0.0106	0.0106	0.3430	0.0308	-0.0000	0.7593
APPLE--3	0.2853	0.2853	0.3498	0.8157	-0.0188	0.7685
APPLE--4	-0.1226	-0.1226	0.2889	-0.4244	-0.0051	0.6608
APPLE--5	-0.2241	-0.2241	0.3487	-0.6429	-0.0117	0.7671
APPLE--6	0.0431	0.0431	0.5085	0.0847	-0.0002	0.8905
APPLE--7	0.0058	0.0058	0.5011	0.0116	-0.0000	0.8872
APPLE--8	-0.1135	-0.1135	0.2249	-0.5044	-0.0072	0.4404
APPLE--9	0.0484	0.0484	0.3819	0.1267	-0.0005	0.8058
APPLE-10	-0.2859	-0.2859	0.2415	-1.1842	-0.0397	0.5143
APPLE-11	0.2970	0.2970	0.3578	0.8302	-0.0195	0.7788
APPLE-12	-0.1529	-0.1529	0.2795	-0.5470	-0.0085	0.6375
APPLE-13	-0.1313	-0.1313	0.3583	-0.3664	-0.0038	0.7795
APPLE-14	-0.1676	-0.1676	0.2582	-0.6490	-0.0119	0.5754

Table 8.34

Stepwise Regression of Group Scores on Teaching Performances (Step 4)
Grade 2 Mathematics (N = 37)

THE DEPENDENT VARIABLE IS GROUPVAR, THE MULTIPLE CORRELATION IS 0.6119, THE STANDARD ERROR OF ESTIMATE= 0.1398

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		36.			
UNDER NULL HYPOTHESIS	1.0000	1.0000	36.			
DUE TO HYPOTHESIS	0.3744	0.3744	4.	0.0936	4.7887	0.0038
ERROR	0.6256	0.6256	32.	0.0195		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 32.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
INDEPENDENT VARIABLES						
RAM----4	0.3145	0.3145	0.1503	2.0928	-0.0856	0.1344
WC-----3	0.3365	0.3365	0.1445	2.3280	-0.1059	0.0643
WC-----2	-0.3383	-0.3383	0.1477	-2.2908	-0.1026	0.1035
APPLE-11	0.3292	0.3292	0.1564	2.1056	-0.0867	0.2005
OTHER VARIABLES				NOW 31.D.F.		
WC-----5	-0.1702	-0.1702	0.1446	-1.1767	0.0267	0.0767
RAM----1	0.0896	0.0896	0.1957	0.4575	0.0042	0.4769
RAM----2	-0.1605	-0.1605	0.1638	-0.9798	0.0188	0.2707
RAM----3	-0.1490	-0.1490	0.1654	-0.9010	0.0160	0.2809
WC-----1	0.0720	0.0720	0.1733	0.4155	0.0035	0.3319
APPLE--1	0.0868	0.0868	0.1421	0.6107	0.0074	0.0125
APPLE--2	-0.1307	-0.1307	0.1419	-0.9213	0.0167	0.0240
APPLE--3	-0.0596	-0.0596	0.1451	-0.4111	0.0034	0.0464
APPLE--4	-0.0644	-0.0644	0.1456	-0.4423	0.0039	0.0544
APPLE--5	-0.0529	-0.0529	0.1537	-0.3442	0.0024	0.1493
APPLE--6	0.0855	0.0855	0.1504	0.5689	0.0065	0.1168
APPLE--7	-0.0970	-0.0970	0.1452	-0.6679	0.0089	0.0567
APPLE--8	-0.0206	-0.0206	0.1454	-0.1414	0.0004	0.0461
APPLE--9	-0.0099	-0.0099	0.1503	-0.0657	0.0001	0.1068
APPLE-10	-0.1690	-0.1690	0.1534	-1.1018	0.0236	0.1744
WC-----4	0.1105	0.1105	0.1596	0.6922	0.0095	0.2196
APPLE-12	0.0240	0.0240	0.1576	0.1521	0.0005	0.1882
APPLE-13	-0.0094	-0.0094	0.1437	-0.0657	0.0001	0.0230
APPLE-14	-0.1446	-0.1446	0.1489	-0.9710	0.0185	0.1172

Reading - Grade 5

Table 8.35 presents the results of the multiple regression of group scores on teaching performances for Grade 5 Reading. R is non-significant.

Table 8.36 presents the results of the stepwise regression of group scores on teaching performances. $R = .64$ ($p < .001$) and $R^2 = .41$. The positive predictors are R-4 (supervised independent seatwork) and WD-1 (time spent teaching reading). The top group probably uses more individual instruction and spends more time teaching reading.

Variety of instructional contexts, mainly WD-4 (variety of instructional contexts) and AP-8 (organizing the instructional process) are negative predictors. This combination suggests a picture of the teacher who is using teaching time to organize rather than instruct.

Mathematics - Grade 5

Table 8.37 presents the results of the multiple regression of group scores against teaching performances. R is not significant.

Table 8.38 presents the results of the stepwise regression of group scores against teaching performances. In this analysis, $R = .60$ ($p < .02$), and $R^2 = .35$. WD-4 (variety of instructional contexts) is a positive predictor.

The significant negative predictors are AP-8 (organizing for instruction), R-1 (time spent in a variety of teaching roles, an index of teaching time) and WD-5 (variety of instructional materials). This pattern has appeared before. We suspect that teachers with high

Table 8.35

Multiple Regression of Group Scores on Teaching Performances
Grade 5 Reading (N = 42)

THE DEPENDENT VARIABLE IS GROUPVAR, THE MULTIPLE CORRELATION IS 0.8157, THE STANDARD ERROR OF ESTIMATE= 0.1327

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		41.			
UNDER NULL HYPOTHESIS	1.0000	1.0000	41.			
DUE TO HYPOTHESIS	0.6654	0.6654	23.	0.0289	1.6426	0.1378
ERROR	0.3346	0.3346	18.	0.0176		

INDEPENDENT VARIABLES	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 19.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
WD-----1	-0.0674	-0.0674	0.2217	-0.3040	-0.0016	0.6416
WD-----2	-0.1864	-0.1864	0.2465	-0.7564	-0.0101	0.7101
WD-----3	-0.1143	-0.1143	0.1787	-0.6395	-0.0072	0.4488
WD-----4	-0.2251	-0.2251	0.2090	-1.0771	-0.0204	0.5967
WD-----5	0.1427	0.1427	0.2386	0.5981	-0.0063	0.6906
RAM----1	0.1214	0.1214	0.2368	0.5128	-0.0046	0.6860
RAM----2	-0.1415	-0.1415	0.2735	-0.5175	-0.0047	0.7645
RAM----3	0.0932	0.0932	0.2670	0.3490	-0.0021	0.7529
RAM----4	0.3098	0.3098	0.2513	1.2330	-0.0268	0.7211
APPLE--1	0.1150	0.1150	0.2206	0.5211	-0.0048	0.6382
APPLE--2	0.3943	0.3943	0.2937	1.3425	-0.0317	0.7958
APPLE--3	-0.0957	-0.0957	0.3240	-0.2955	-0.0015	0.8322
APPLE--4	0.3405	0.3405	0.2530	1.3461	-0.0319	0.7248
APPLE--5	0.1207	0.1207	0.3498	0.3449	-0.0021	0.8560
APPLE--6	-0.0093	-0.0093	0.3386	-0.0274	-0.0000	0.8464
APPLE--7	-0.1574	-0.1574	0.3439	-0.4577	-0.0037	0.8511
APPLE--8	-0.5568	-0.5568	0.1853	-3.0050	-0.1590	0.4870
APPLE--9	-0.1627	-0.1627	0.1989	-0.8182	-0.0118	0.5546
APPLE-10	0.1072	0.1072	0.2067	0.5187	-0.0047	0.5879
APPLE-11	-0.3137	-0.3137	0.2323	-1.3503	-0.0321	0.6737
APPLE-12	0.1648	0.1648	0.2108	0.7816	-0.0108	0.6037
APPLE-13	-0.4389	-0.4389	0.2179	-2.0137	-0.0714	0.6292
APPLE-14	-0.4937	-0.4937	0.2019	-2.4452	-0.1053	0.5679

Table 8.36

Stepwise Regression of Group Scores on Teaching Performances (Step 4)
Grade 5 Reading (N = 41)

THE DEPENDENT VARIABLE IS GROUPVAR. THE MULTIPLE CORRELATION IS 0.6425. THE STANDARD ERROR OF ESTIMATE= 0.1260

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		41.			
UNDER NULL HYPOTHESIS	1.0000	1.0000	41.			
DUE TO HYPOTHESIS	0.4129	0.4129	4.	0.1032	6.5041	0.0005
ERROR	0.5871	0.5871	37.	0.0159		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 37.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
INDEPENDENT VARIABLES						
WC-----4	-0.5864	-0.5864	0.1453	-4.0357	-0.2585	0.2485
APPLE--8	-0.6048	-0.6048	0.1524	-3.9681	-0.2499	0.3168
RAM----4	0.4505	0.4505	0.1627	2.7685	-0.1216	0.4007
WC-----1	0.2657	0.2657	0.1333	1.9941	-0.0631	0.1063
OTHER VARIABLES				NOW 36.D.F.		
WC-----5	0.0841	0.0841	0.1307	0.6430	0.0067	0.0567
RAM----1	0.0653	0.0653	0.1583	0.4126	0.0028	0.3524
RAM----2	0.2000	0.2000	0.1517	1.3189	0.0271	0.3238
RAM----3	-0.0981	-0.0981	0.1614	-0.6080	0.0060	0.3800
WC-----3	-0.1441	-0.1441	0.1275	-1.1296	0.0201	0.0314
APPLE--1	0.0576	0.0576	0.1326	0.4345	0.0031	0.0774
APPLE--2	0.1637	0.1637	0.1323	1.2375	0.0240	0.1056
APPLE--3	-0.1523	-0.1523	0.1433	-1.0629	0.0179	0.2295
APPLE--4	0.1064	0.1064	0.1439	0.7393	0.0088	0.2237
APPLE--5	-0.0608	-0.0608	0.1358	-0.4479	0.0033	0.1201
APPLE--6	0.1317	0.1317	0.1274	1.0340	0.0169	0.0238
APPLE--7	-0.0599	-0.0599	0.1392	-0.4305	0.0030	0.1624
WC-----2	-0.1493	-0.1493	0.1383	-1.0795	0.0184	0.1744
APPLE--9	-0.1163	-0.1163	0.1381	-0.8423	0.0113	0.1611
APPLE-10	0.0909	0.0909	0.1314	0.6919	0.0077	0.0675
APPLE-11	-0.0298	-0.0298	0.1336	-0.2231	0.0008	0.0870
APPLE-12	-0.0600	-0.0600	0.1304	-0.4601	0.0034	0.0470
APPLE-13	-0.0829	-0.0829	0.1295	-0.6400	0.0066	0.0385
APPLE-14	-0.1407	-0.1407	0.1360	-1.0346	0.0170	0.1440

Table 8.37

Multiple Regression of Group Scores Against Teaching Performances
Grade 5 Mathematics (N = 45)

THE DEPENDENT VARIABLE IS GROUPVAR, THE MULTIPLE CORRELATION IS 0.6994, THE STANDARD ERROR OF ESTIMATE= 0.1524

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		45.			
UNDER NULL HYPOTHESIS	1.0000	1.0000	45.			
DUE TO HYPOTHESIS	0.4891	0.4891	23.	0.0213	0.9159	0.5829
ERROR	0.5109	0.5109	22.	0.0232		

INDEPENDENT VARIABLES	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 22.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
WD-----1	-0.2218	-0.2218	0.2448	-0.9058	-0.0191	0.6126
WD-----2	-0.3203	-0.3203	0.4025	-0.7959	-0.0147	0.8567
WD-----3	-0.0128	-0.0128	0.2481	-0.0514	-0.0001	0.6229
WD-----4	0.4325	0.4325	0.3314	1.3051	-0.0395	0.7886
WD-----5	-0.2793	-0.2793	0.1931	-1.4462	-0.0486	0.3774
RAM----1	-0.3948	-0.3948	0.3035	-1.3009	-0.0393	0.7479
RAM----2	0.6476	0.6476	0.4063	1.5937	-0.0590	0.8594
RAM----3	-0.4542	-0.4542	0.4151	-1.0943	-0.0278	0.8652
RAM----4	-0.3090	-0.3090	0.3939	-0.7843	-0.0143	0.8504
APPLE--1	0.2104	0.2104	0.2641	0.7968	-0.0147	0.6670
APPLE--2	-0.0813	-0.0813	0.2754	-0.2953	-0.0020	0.6939
APPLE--3	0.2105	0.2105	0.2388	0.8814	-0.0180	0.5929
APPLE--4	-0.0529	-0.0529	0.2095	-0.2523	-0.0015	0.4711
APPLE--5	0.0035	0.0035	0.2669	0.0132	-0.0000	0.6740
APPLE--6	0.1013	0.1013	0.2934	0.3452	-0.0028	0.7302
APPLE--7	0.0086	0.0086	0.2191	0.0390	-0.0000	0.5165
APPLE--8	-0.4585	-0.4585	0.2185	-2.0986	-0.1023	0.5135
APPLE--9	-0.0724	-0.0724	0.2486	-0.2913	-0.0020	0.6241
APPLE-10	0.0002	0.0002	0.2293	0.0009	-0.0000	0.5584
APPLE-11	0.0881	0.0881	0.2523	0.3492	-0.0028	0.6352
APPLE-12	-0.1636	-0.1636	0.3162	-0.5173	-0.0062	0.7677
APPLE-13	0.3366	0.3366	0.1961	1.7160	-0.0684	0.3964
APPLE-14	0.2447	0.2447	0.2555	0.9580	-0.0213	0.6442

Table 8.38

Stepwise Regression of Group Scores on Teaching Performances (Step 7)
Grade 5 Mathematics (N = 45)

THE DEPENDENT VARIABLE IS GROUPVAR. THE MULTIPLE CORRELATION IS 0.5957. THE STANDARD ERROR OF ESTIMATE= 0.1320

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		44.			
UNDER NULL HYPOTHESIS	1.0000	1.0000	44.			
DUE TO HYPOTHESIS	0.3549	0.3549	7.	0.0507	2.9075	0.0158
ERROR	0.6451	0.6451	37.	0.0174		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 37.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
INDEPENDENT VARIABLES						
APPLE--8	-0.2958	-0.2958	0.1342	-2.2038	-0.0847	0.0323
WC-----3	-0.1804	-0.1804	0.1428	-1.2631	-0.0278	0.1453
RAM----1	-0.2631	-0.2631	0.1423	-1.8490	-0.0596	0.1389
WC-----5	-0.2706	-0.2706	0.1394	-1.9416	-0.0657	0.1024
WC-----4	0.2770	0.2770	0.1471	1.8825	-0.0618	0.1946
APPLE-13	0.1993	0.1993	0.1458	1.3668	-0.0326	0.1800
WC-----1	-0.1859	-0.1859	0.1529	-1.2163	-0.0258	0.2539
OTHER VARIABLES				NOW 36.D.F.		
RAM----3	-0.1258	-0.1258	0.1949	-0.6454	0.0074	0.5338
RAM----4	-0.1102	-0.1102	0.1709	-0.6449	0.0074	0.3935
APPLE--1	0.0100	0.0100	0.1446	0.0692	0.0001	0.1435
APPLE--2	-0.1115	-0.1115	0.1447	-0.7704	0.0105	0.1578
APPLE--3	0.1473	0.1473	0.1479	0.9954	0.0173	0.2030
APPLE--4	0.0383	0.0383	0.1400	0.2734	0.0013	0.0871
APPLE--5	-0.0835	-0.0835	0.1441	-0.5795	0.0060	0.1453
APPLE--6	0.0909	0.0909	0.1471	0.6176	0.0068	0.1805
APPLE--7	0.0127	0.0127	0.1471	0.0867	0.0001	0.1715
RAM----2	0.0848	0.0848	0.2056	0.4125	0.0030	0.5783
APPLE--9	0.0703	0.0703	0.1456	0.4828	0.0041	0.1600
APPLE-10	0.0544	0.0544	0.1464	0.3715	0.0025	0.1676
APPLE-11	0.0379	0.0379	0.1472	0.2572	0.0012	0.1748
APPLE-12	0.0055	0.0055	0.1403	0.0395	0.0000	0.0891
WC-----2	-0.0110	-0.0110	0.1905	-0.0579	0.0001	0.5063
APPLE-14	0.1189	0.1189	0.1438	0.8267	0.0120	0.1499

scores on these variables are spending more time organizing for instruction than they are actually teaching, and the variety of instructional materials complicates this process. R-1 is weighted with individual instructing and facilitating. We suspect that we have a picture of a teacher who is attempting to individualize instruction but is not doing so effectively. An alternative description would be a teacher who organizes poorly and must, as a consequence, spend a good deal of time interacting with pupils to clarify their task.

Summary and Interpretations

Two kinds of data have been presented in this chapter. The first showed that classes differed in the pattern of mean differences. These different patterns were sorted into three kinds: (1) a group where the slopes of the regression lines were shallow and the intercepts large; (2) a group where the slopes were steep and the intercepts small (near zero) or negative; (3) an intermediate group where the slopes were close to 1 and the intercepts positive.

We presented the point of view that these differences reflected differences in the effectiveness of the learning experiences being provided. A learning experience was defined as more effective if one class had made greater gains across the entire score range than another class. On the basis of this criterion, the three groups were assigned a weight of +1 for that group of ten teachers with shallowest slopes and largest intercepts; of -1 to the group with the steepest slopes and smallest intercepts; and a weight of 0 to the remainder.

We then regressed these scores against teaching performances. The purpose of this analysis was to determine if teaching performances accounted for the differences in these patterns. Significant regressions were found at both grades and in both subjects when stepwise regressions were performed. The multiple regressions were significant only for second-grade reading.

Grade 2 Reading

Significant and substantial R's were obtained in the multiple and stepwise regressions of group-location scores on teaching performances. These predictors accounted for 99 and 92 percent of the variance in group scores. These results are summarized in Table 8.39

An interpretation is offered of the picture of teaching performances which distinguished the top ten from the bottom ten classes. This interpretation was made by asking what the picture would look like if a teacher had high scores on the positive predictors and what it would look like if he or she had high scores on the negative predictors.

The positive predictors may be collected into five groups:

1. Organization of Instruction: WD-4 (variety of instructional contexts); R-4 (supervised independent seatwork); and AP-5 (independent pupil work)
2. Materials of Instruction: WD-5 (variety of materials) and R-3 (variety of materials)
3. Teaching Activity: AP-10 (developing pupil understanding)
4. Teacher Responses: AP-11 (teacher mobility); AP-13 (social control, mainly by redirecting); and AP-14 (nonresponsiveness to pupils mainly by ignoring)

Table 8.39

Summary of Significant Positive and Negative Predictors in Multiple and Stepwise Regressions of Group-Location Scores on Teaching Performances - Grade 2 Reading and Mathematics

Grade 2 Reading

Multiple Regression		% Var.	Stepwise Regressions		% Var.
+	-	99	+	-	92
WD-4			WD-4		
WD-5	WD-1		WD-5	WD-1	
R-3	WD-2		R-3	WD-2	
R-4	WD-3		AP-1	WD-3	
AP-1	R-1		AP-5	R-1	
AP-3	AP-2		AP-10	AP-2	
AP-5	AP-6		AP-14	AP-8	
AP-10	AP-7			AP-6	
AP-11	AP-8			AP-12	
AP-13	AP-9				
AP-14	Ap-12				

Grade 2 Mathematics

Multiple Regressions		% Var.	Stepwise Regressions		% Var.
+	-	--	+	-	37
n.s.	n.s.		WD-3	WD-2	
			R-4		
			AP-11		

5. Pupil Behavior: AP-1 (pupil productivity) and AP-3 (attentiveness)

The picture that emerges is one of direct individual instruction. Each pupil is working on reading materials (R-4, AP-5); these materials are varied (WD-5, R-3). The teacher supervises this work (R-4) and moves among the pupils (AP-11). The teacher spends more time developing pupil understanding (AP-10). The pupils are productive (AP-1). The teacher maintains on-task orientation (AP-3) by indirect methods (AP-13, AP-14), either redirecting the pupil's attention to the work (AP-13) or ignoring inconsequential actions or mistakes (AP-14).

These relations suggest a teaching style that is mainly working with each child, but the teacher varies the instructional context (WD-4). The methods of social control are work-related (AP-13). The emphasis is on understanding the work at hand (AP-10).

The negative predictors present an interesting contrast. They may be grouped as follows:

1. Organization of Instruction: AP-6 (teacher-group) and AP-7 (teacher-class)
2. Instructional Time: WD-1 (teaching time) and R-1 (teaching and support time)
3. Instructional Goals: WD-2 (varied instructional content each period) and WD-3 (complexity of the teacher's conceptualization of the instructional design)
4. Teacher Activity: AP-8 (organizing) and AP-9 (monitoring pupil progress)

5. Teacher Response: AP-12 (responsiveness, mainly positive reinforcement and praise)

6. Pupil Behavior: AP-2 (inattentiveness)

These predictors suggest a pattern in which the teacher does more instruction to groups (AP-6) and the class-as-a-whole (AP-7), and is attempting to teach more content (WD-2, WD-3). The interactions with the pupil are a relatively brief monitoring of pupil progress (AP-9). Frequently questions are followed by positive reinforcement or recognition (AP-12). The level of pupil task-orientation is low (AP-2).

There are two components in this style which are probably its critical components. High scores on AP-8 (organizing), WD-1 (teaching time) and R-1 (teaching and support time) means that the teacher is spending considerable time instructing, but is spending more of that time organizing instruction than instructing. That these teachers may be ineffective in organizing instruction is suggested by AP-2 (pupil inattentiveness) as a negative predictor. Also when the teacher interacts with pupils the mode is unsustained (AP-9). AP-12 (responsiveness to individual pupils such as positive reinforcement) as a negative predictor may be surprising if considered only by itself. There is a modest correlation between AP-9 and AP-12, $\underline{r} = .19$. Thus teachers who interact briefly may follow these interactions with praise or positive reinforcement. We suggest that it is the combination of these two performances which develops into an ineffective pattern, particularly when the teacher is spending considerable time organizing the instructional process.

Grade 2 Mathematics

In the multiple-regression analysis, teaching performances do not predict differences in the patterns of mean difference scores. In the stepwise regression, a few predictors appeared. They accounted for 37 percent of the variance in group scores. These results are summarized in Table 8.39.

In this case WD-3 (complexity of conceptualization of instructional design) was a positive predictor. R-4 (supervised seatwork), also a positive predictor, is probably the critical component. The mathematical tasks in the second grade are usually those of beginning arithmetic. This learning is probably best facilitated by more rather than less practice. If this practice includes supervised seatwork (R-4) and teacher mobility (AP-11) it is likely to be effective. Thus the combination of R-4 and AP-11 suggest an instructional system in which the pupils work on problems and this work is supervised by the teacher.

WD-3 (complexity of conceptualization of the instructional design) is positively correlated with AP-5 (independent seatwork), so is probably an indicator of this performance; but WD-3 has a somewhat larger correlation with the dependent variable, $\underline{r} = .25$, than AP-5, $\underline{r} = .14$. We suggest that the positive predictors indicate a pattern of direct individual isntruction.

WD-2 (variety of specific skills taught) is a negative predictor. We think that this means that the content must be structured or ordered sequentially. The pupils are learning the elements of arithmetic, and the learning of successive steps is highly dependent on learning the earlier steps. Trying to cover several topics or not providing

enough time for practicing, reviewing or explaining or by trying to provide all of them may be too disruptive.

WD-2's correlations with other performances seem to support this suggestion. WD-2, for example, is positively correlated with WD-4 (variety of instructional contexts), r = .44; WD-5 (variety of materials), r = .23; AP-9 (monitoring pupil progress), r = .22; but is negatively correlated with AP-10 (developing pupil understanding), r = -.30. A combination of these performances portrays a teacher who has varied the materials and the contexts and is interacting with the pupils briefly in questions and answers, but is not engaged in developing pupils' understanding.

Grade 5 Reading

The multiple regression produced no significant predictors, positive or negative. In the stepwise regression WD-1 (time spent teaching) and R-4 (supervised independent seatwork) are both positive predictors. (See Table 8.40.) Both of these variables are positively correlated with other measures of supervised individual instruction and negatively correlated with teaching in groups and the class-as-a-whole. They account for 41 percent of the variance in group scores.

WD-4 (varied instructional contexts), a negative predictor, is positively correlated with WD-2 (varied content). This combination in conjunction with AP-8 (organizing for instruction) suggests the picture of a teacher who is trying to do too much, or has not organized these approaches very well.

Table 8.40

Summary of Significant Positive and Negative Predictors in Multiple and Stepwise Regressions of Group-Location Scores on Teaching Performances - Grade 5 Reading and Mathematics

Grade 5 Reading

Multiple Regression		Stepwise Regression		% Var.
+	-	+	-	41
n.s.	n.s.	WD-1	WD-4	
		R-4	AP-8	

Grade 5 Mathematics

Multiple Regression		Stepwise Regression		% Var.
+	-	+	-	35
n.s.	n.s.	WD-4	R-1	
			WD-5	
			AP-8	

At this grade in reading a pattern of instruction that involves working with each child again seems to provide a more effective learning experience. One correlation is suggestive. WD-4 (variety of instructional contexts) is positively correlated with AP-3 (pupil productivity), $\underline{r}$ = .44, so one sees in these classes productive pupil work. But WD-4 has a zero correlation with AP-10 (developing pupil understanding); so we suspect that WD-4 is an index of effort on the part of the teacher to vary the reading instruction, but the instruction is not characterized by developing understanding. This lack would seem to be critical in reading at the fifth grade where reading instruction is devoted to developing comprehension, and where the reading materials place greater cognitive demands on the child.

Grade 5 Mathematics

Again the multiple regressions yielded nonsignificant R's. But the stepwise regression produced one positive predictor, WD-4 (variety of instructional contexts), and three negative predictors, R-1 (time spent teaching), WD-5 (variety of materials) and AP-8 (organizing for instruction). These predictors account for 35 percent of the variance in group scores.

WD-4 (variety of instructional contexts) is highly correlated with WD-2 (variety of content covered), $\underline{r}$ = .66, and with WD-1 (time spent instructing), $\underline{r}$ = .37. We suspect WD-4 is a proxy for the other two variables. The picture might be something like this: the teacher uses a variety of instructional strategies to cover more mathematical content, and spends more time teaching mathematics. The pupils learn

more content. The tests are content-bound, so pupils who have learned more content are more likely to have higher scores. Even a pupil who is less proficient at the beginning of the year has more opportunities to respond correctly because the substance of more items will be familiar to him or her.

R-1 (time spent) is a negative predictor highly correlated with the other three RAMOS variables. High scores on all four RAMOS variables means that the teacher is using a variety of materials, has more purposes during the lesson, and mainly uses supervised independent work. Thus R-1 is a proxy in the analysis for these other variables (r's with R-2, R-3, and R-4 are .73, .68, and .56). This pattern of instruction is ineffective in teaching fifth-grade mathematics.

AP-8 (organizing) appears as a negative predictor. Its presence means that spending more time organizing than instructing interferes with the effectiveness of the learning experience. It may also be that the pattern of individualized instruction associated with R-1 is easily disorganized.

Conclusion

In reviewing the results of this analysis the reader will notice several facts. With the exception of AP-8, there are no performance variables which are significant predictors common to both grades and subjects. Only at the second grade are the predictors similar for both subjects. There a pattern of direct individual instruction is likely to be effective. But even in this case, the effective patterns

are not identical. A variety of materials in teaching mathematics is not effective.

It is also important to remember that while we have used common names for the performances irrespective of the grade and subject, these performances are correlated differently by grade and subject. Such data strongly suggest that the teaching patterns are quite different in these respects. A variable like AP-9 (monitoring pupil progress), for example, is associated with AP-10 in second-grade reading but not in second-grade mathematics. These patterns may be so distinctive that the frequency of a variable like AP-10 will be low in the second-grade teaching performance data, hence will have little variance, and is not therefore likely to show up as a predictor in the regression analyses.

Possibilities like this suggest the need for intensive study of teachers whose classes have had more effective learning experiences. Had we had time and resources we would have gone back to the original measures of teaching performance for a more detailed analysis of the precise ways in which these teachers differed from others. But the data presented here are sufficient to suggest the domains of teaching performance that should be considered in replications of this study.

The frequency with which AP-8 (organizing for instruction) appears as a negative predictor should not be overlooked. Organizing for instruction is necessary but more time spent organizing takes time away from instructional activities. Also some other performances such as providing a variety of materials may lose their effectiveness

when the teacher spends considerable time organizing for their use. The reader should not conclude that we observed disorganized teachers. A visitor to these classes would have seen what appeared to be organized instruction. But careful attention to what was being said revealed that some teachers spend more time than others giving directions, passing out materials, and helping pupils find materials and understand what to do. The actual differences between teachers are not great during any period, but the effect is cumulative. A teacher, for example, who spends ten minutes a reading period giving directions, etc., uses up the equivalent of one reading period a week. In the next chapter we will see what characterisitcs of teachers are associated with this performance, and we will also look at teaching performances and pupil learning in the context of other variables.

BEGINNING TEACHER EVALUATION STUDY: PHASE II

FINAL REPORT: VOLUME I, CHAPTER 9

THE RESULTS OF THE STRUCTURAL ANALYSIS

INTRODUCTION

The data presented to this point have considered only the teaching performance variables and the achievement scores in reading and mathematics. We have found that the performance variables predict the achievement scores. In this chapter we consider the relation of these variables to the other variables on which data were gathered. We are answering four questions: (1) what variables associated with characteristics of the teachers relate to teaching performances; (2) what variables associated with the environment of teaching relate to teaching performances; (3) what variables associated with pupils relate to their learning; and (4) what teaching performances relate to pupil behavior and learning?

In answering these questions we are looking at the significance of the relations in the structural model presented in Chapter 6. (This figure is reproduced here for the reader's convenience.) Path analysis was the technique used to explore these relations.

The numbers reported are path coefficients. They are similar to partial regression coefficients which take into account the partial correlations of the variables which are interconnected in a particular path. Consider for example, AP-1, AP-2 and AP-3, the domain of Students' Behavior. In the structural model, there are paths from each of these three variables to each measure of learning outcomes. The technique used to generate the pc's (path coefficients) takes into account the correlations among all the variables. The pc value is a function of these correlations. This function is represented

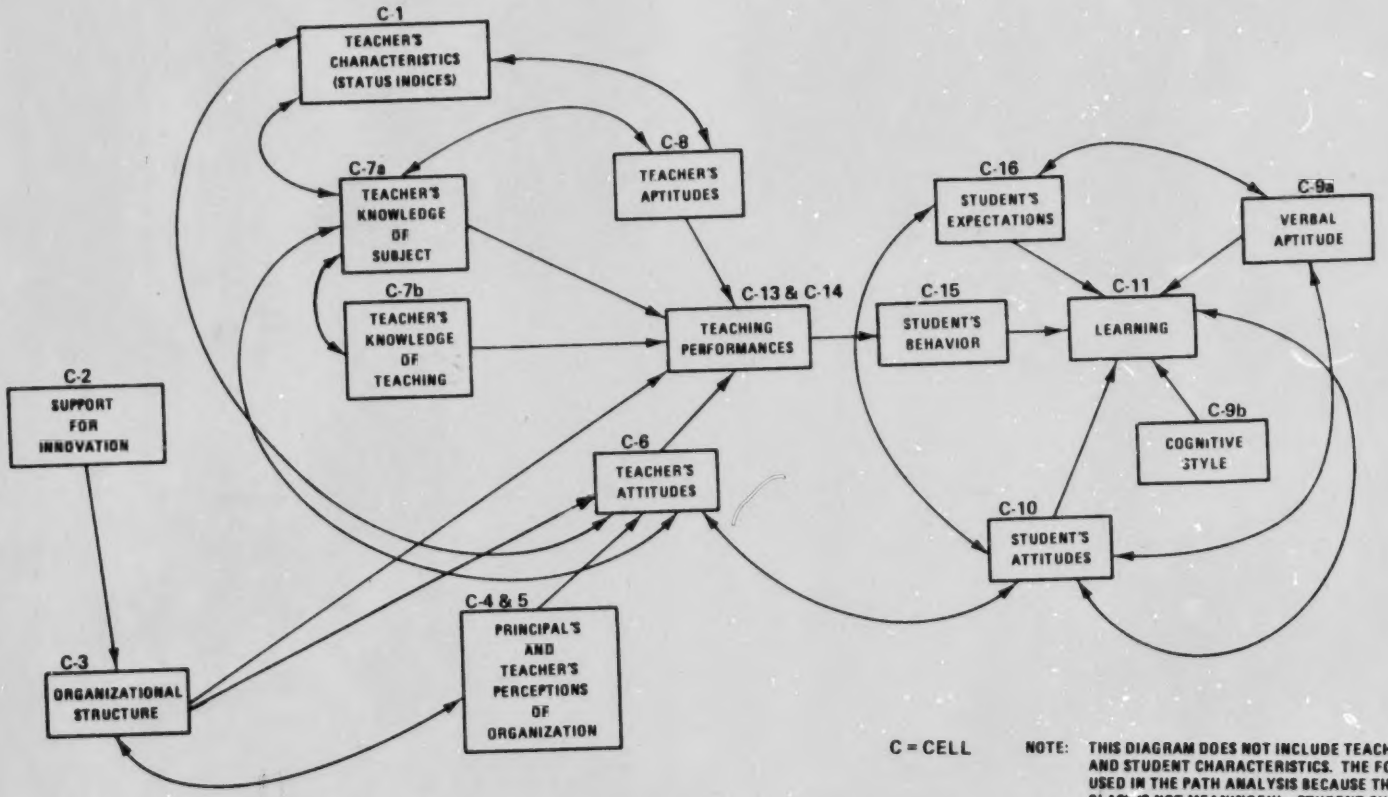


Figure 6.1. A Structural Model of the Domain of Variables Influencing Teaching Performances and Children's Learning

in a linear equation. In the more complex parts of the model where there may be several paths from one domain to another, pc is a function of the preceding pc-values as well as of the correlations among the variables in the domains being discussed.

The pc-values vary in magnitude and sign. We have chosen pc = .25 as a path coefficient of sufficient magnitude to consider for discussion.

In the following sections, we will look first at the path coefficients for paths between Student's Behavior (AP-1, AP-2 and AP-3), and the measures of learning. In these tables, the paths between teaching performance variables and pupil behavior are also shown. The reader should note that we are providing values for the component reading and mathematics scores as well as for total scores on the achievement measures.

Then we present the path coefficients for paths <u>to</u> the teaching performance variables. This discussion is followed by the discussion of paths associated with the organizational structure. As the last topic we return to the right-hand side of Figure 6.1 and consider the paths from domains of student variables to achievement.

These sections are concerned with the following questions:

1. What is the relation of pupil behavior to achievement?
2. What is the relation of teaching performance to pupil behavior?
3. What is the relation of teacher aptitude, knowledge and attitude to teaching performance?
4. What is the relation of the organizational structure to teaching performance?

5. What is the relation of the environment of teaching to teachers' attitudes?
6. What is the relation of students' attitudes, aptitude, and expectations to learning?

The Relation of Teaching Performances to Student Behavior and Learning

In this section we consider the relation of Teaching Performances to Student's Behavior to Learning. The reader should recall that previously we have been grouping the pupil behavior measures (AP-1, AP-2 and AP-3) together with other measures. We have treated the pupil behavior measures as indices of characteristics of teaching performances. They represent the effects of teaching performances on pupil behavior.

We are considering the actions of the teacher and the actions of the students as dyadic units. When a teacher asks a student a question the student responds, the teacher praises the student for the answer or corrects the answer. This sequence of actions is represented in the collection of performances by AP-9 (monitoring pupil progress) and by AP-1 (pupil productivity). Thus a category such as AP-1 is an index of the amount of questioning the teacher may be doing or the amount of responding to questions the student may be doing; AP-3 is an estimate of the on-task behavior of the student as he or she works at the task materials.

AP-2 (inattentiveness) is a measure of the amount of off-task behavior of the students. This index also may be linked with the kinds of techniques the teacher is likely to be using to control for inattentiveness. AP-13 (social control) is a measure of the attempts by the teacher to keep the student involved in the instruction. In the data that we have discussed previously, we have seen instances where teaching performance is characterized by AP-13 and AP-3, and other performances characterized by AP-8 (organizing instruction) and AP-2. These combinations indicate that one teacher is keeping students on tasks (AP-13), and that this effort is reflected in higher attentiveness (AP-3) scores for the class; whereas the second combination reflects a picture of a teacher who by spending more time organizing (AP-8) has relatively less control over students' inattentive behavior (AP-2).

The causal model predicts that the teacher's actions influence the student behavior and the variation in the student behavior is directly related to what the students learn. These hypotheses are commonly accepted and the data that we will present will provide estimates of their validity.

Reading - Grades 2 and 5

Table 9.1 presents the results of regressing mean difference scores for reading on all of the teaching performances, that is, including the student behavior measures AP-1, AP-2 and AP-3. The scores for the Total Group of teachers, T, have been used in this

analysis and in all subsequent analyses. Note that we are also presenting the data for the component tests whose scores contribute to the total reading scores that we have been examining up to this point.

Only three significant R's are obtained, for reading comprehension and decoding at grade 2 and for decoding at grade 5. The reader will recall that when we presented the regression analysis for total reading scores we obtained non-significant R's, and those non-significant R's appear in Table 9.1 opposite the reading total line. Recall also that stepwise regressions produced more significant R's.

A reasonable conclusion from the data in Table 9.1 is that teaching performances contribute primarily to the learning of decoding skills. Table 9.2 presents the intercorrelations among the reading measures for both grade levels. As can be seen in that table, the decoding measure correlates positively with the total reading score, r = .43 at grade 2, and considerably less at grade 5 where r = .29. At grade 2, reading application is highly correlated with reading total, r = .84, and reading achievement (a measure of reading comprehension) correlates positively with reading total also, r = .64. Thus the total reading score is a combination of scores on measures of comprehension and on measures of decoding.

Considering both correlations among measures and significant R's, it is reasonable to assume that teaching performance is affecting decoding at grade 2, and through influencing decoding skills is also

Table 9.1

Multiple R's for the Regression of Mean Difference Scores for Reading on Teaching Performances: Grades 2 and 5

OUTCOMES	R	F	p	DF(H:E)	PROP VAR (D:E)	SE
GRADE 2						
CAT - READING COMPREHENSION	.8435	1.9054	.0894*	22/17	.7115/.2885	.1303
READING APPLICATION	.6571	.5871	.8805	22/17	.4317/.5683	.1828
DECODING	.8704	2.4140	.0341*	22/17	.7575/.2425	.1194
READING ACHIEVEMENT	.8127	1.5029	.1975	22/17	.6604/.3396	.1413
READING TOTAL	.6582	.5905	.8779	22/17	.4332/.5668	.1826
GRADE 5						
CAT - READING COMPREHENSION	.6011	.7971	.7065	22/31	.3613/.6387	.1435
READING APPLICATION	.6833	1.2342	.2899	22/31	.4669/.5331	.1311
DECODING	.7762	2.1363	.0257*	22/31	.6026/.3974	.1132
READING ACHIEVEMENT	.6409	.9821	.5092	22/31	.4107/.5893	.1379
READING TOTAL	.6076	.8247	.6768	22/31	.3692/.6308	.1426

*$.10 \leq p \leq .01$

Table 9.2

Intercorrelations Among Reading Measures

Grade 2

	RC	R.AP.	DEC.	R.ACH.	R.TOT.
CAT - Reading Comprehension	---				
Reading Application	.0965	---			
Decoding	.1928	.4431	---		
Reading Achievement	.1516	.4352	.4672	---	
Reading Total	.4781	.8363	.4339	.6372	---

Grade 5

	RC	R.AP.	DEC.	R.ACH.	R.TOT.
CAT - Reading Comprehension	---				
Reading application	.1780	---			
Decoding	-.0510	.4327	---		
Reading Achievement	.0978	.2221	.1047	---	
Reading Total	.4971	.7842	.2886	.6579	---

influencing reading comprehension. A similar pattern of inter-correlations exists at grade 5 except that decoding has a smaller correlation with reading total than it did at grade 2. We can infer at grade 5 that teaching performances are affecting decoding skills, but are not having a significant effect on reading comprehension skills.

Mathematics - Grades 2 and 5

Table 9.3 presents the results of regressing mean difference scores for mathematics on teaching performances. Again we included in this analysis all of the teaching performances including pupil behavior, and the group whose scores were used in the analysis is again the total group. A significant R for mathematics total scores is obtained at both grade levels as we have previously seen. At grade 2 a significant R is also obtained for the measure of mathematical computation. At grade 5 both the measures of mathematical computation and of mathematical applications are significantly related to teaching performances.

We may speculate that teaching performances are significantly affecting the learning of mathematical computation at grade 2 and this learning influences the total score. This conclusion may also be made for grade 5 mathematics scores. At both grade levels the measure of computation is highly correlated with total scores (see Table 9.4).

Table 9.3

Multiple R's for the Regression of Mean Difference Scores for Mathematics on Teaching Performances: Grades 2 and 5

OUTCOMES	R	F	p	DF(H:E)	PROP VAR (H:E)	SE
			GRADE 2			
CAT - CONCEPTS	.7404	.9925	.5126	22/18	.5481/.4519	.1584
CAT - COMPUTATION	.8945	3.2749	.0066*	22/18	.8001/.1999	.1054
MATH APPLICATION	.8086	1.5454	.1760	22/18	.6538/.3462	.1387
MATH TOTAL	.8415	1.9854	.0720*	22/18	.7082/.2918	.1273
			GRADE 5			
CAT - CONCEPTS	.6166	.8643	.6339	22/31	.3802/.6198	.1414
CAT - COMPUTATION	.8401	3.3792	.0010*	22/31	.7057/.2943	.0974
MATH APPLICATION	.7729	2.0902	.0292*	22/31	.5973/.4027	.1140
MATH TOTAL	.7988	2.4840	.0099*	22/31	.6380/.3620	.1081

*$.10 \leq p \leq .01$

Table 9.4

Intercorrelations Among Mathematics Measures
Grade 2

	CAT CONCEPTS	CAT COMPUTATION	MATH APP.	MATH TOTAL
CAT CONCEPTS	------			
CAT COMPUTATION	-.1792	-------		
MATH APPLICATION	.4201	.1151	----	
MATH TOTAL	.4387	.6446	.7720	-----

Grade 5

	CAT CONCEPTS	CAT COMPUTATION	MATH APP.	MATH TOTAL
CAT CONCEPTS	------			
CAT COMPUTATION	.2672	------		
MATH APPLICATION	.2064	.4020	----	
MATH TOTAL	.5356	.7085	.8605	----

But at fifth grade, mathematical application scores are also highly correlated with mathematics total scores, $r = .86$. Here we may speculate that the significant R for the total mathematics score results as a consequence of the relation between the total score and the scores for computation and applications. At the fifth grade level, teaching performance is significantly related to pupil learning of mathematical computation and applications.

Tables 9.1 to 9.4 presented the basic achievement data obtained in this study in terms of the relationship of teaching performances to achievement. In the analyses presented in these tables we have regressed mean difference scores against teaching performances. The reader will recall from the data presented in Chapter 7 that when the teaching performances as a set were used we rarely obtained significant results--only for multiple regressions for grade 2 and grade 5 mathematics. In the analyses presented in Chapter 7 we were presenting only the results with respect to the total scores. In this section we have presented the results for all the socres, and from these results can begin to picture how teaching performances are probably affecting different aspects of the learning of reading and of the learning of mathematics. We suspect that we have here a picture of what teachers emphasize in teaching reading and teaching mathematics.

In the following sections we consider the structure of performances in relation to outcomes. The numbers the reader will be seeing are path coefficients. Their relative magnitude is an indication of the relation between the variable from which the path is drawn to the variable where the path ends.

The Relation of Teaching Performances to Student's Behavior and of Student's Behavior to Learning Outcomes

Reading - Grade 2

In this section we present the results of the path analysis for the teaching performances, pupil behavior, and outcome paths. Table 9.5, for example, lists the path coefficients between each of the pupil behaviors, AP-1, AP-2 and AP-3, and the reading outcomes, and each of the teacher performance variables derived from the Work Diaries (WD-1 through WD-5).

First consider AP-1 which is a measure of pupil productivity during the teaching session. Pupil productivity has a path coefficient of .28 with decoding outcomes. We can conclude that working on decoding skills in class (as reflected in pupil productivity) is related to the learning of decoding skills. We have previously suggested that in classes where we would see students performing correctly in reading skills and where students were task-oriented when working on materials teaching decoding skills, greater learning of decoding skills occurs. The interesting question is, are there any teacher performance variables related to AP-1? The reader will now need to look at Tables 9.5, 9.6 and 9.7.

We see in Table 9.5 that WD-3, conceptual quality of instructional design, has a path coefficient of .35 to AP-1. In Table 9.6, R-3 (variety of materials) has a negative path coefficient equal to - .36 to AP-1. In Table 9.7 we see that AP-6 (.50) and AP-7 (.38), have

Table 9.5

Path Coefficients for Paths from Work Diary Variables to Pupil Behavior to Outcomes; Grade 2 Reading (N = 40)

TEACHING PERFORMANCE		STUDENT BEHAVIOR	STUDENT OUTCOMES (READING)	
WD - 1	-.1158	APPLE #1	-.0844	READING COMPREHENSION
WD - 2	.0285		.1536	READING APPLICATION
WD - 3	.3482		.2777	DECODING
WD - 4	.1606		.0273	READING ACHIEVEMENT
WD - 5	-.1681		.1706	TOTAL READING
WD - 1	-.1682	APPLE #2	-.2022	READING COMPREHENSION
WD - 2	-.4761		.0221	READING APPLICATION
WD - 3	-.1552		.0361	DECODING
WD - 4	.2660		.0909	READING ACHIEVEMENT
WD - 5	.4658		-.0732	TOTAL READING
WD - 1	.4936	APPLE #3	-.1091	READING COMPREHENSION
WD - 2	.1505		.1231	READING APPLICATION
WD - 3	-.3492		-.0126	DECODING
WD - 4	.0848		-.0655	READING ACHIEVEMENT
WD - 5	-.4537		-.0007	TOTAL READING

Table 9.6

Path Coefficients for Paths from RAMOS Variables to Pupil Behavior to Outcomes; Grade 2 Reading (N = 40)

TEACHING PERFORMANCE (RAMOS)		STUDENT BEHAVIOR	STUDENT OUTCOMES (READING)	
RAMOS - 1	-.2431	APPLE #1	-.0844	READING COMPREHENSION
RAMOS - 2	.1543		.1536	READING APPLICATION
RAMOS - 3	-.3585		.2777	DECODING
RAMOS - 4	.1165		.0273	READING ACHIEVEMENT
			.1706	TOTAL READING
RAMOS - 1	-.3262	APPLE #2	-.2022	READING COMPREHENSION
RAMOS - 2	.3350		.0221	READING APPLICATION
RAMOS - 3	.1493		.0361	DECODING
RAMOS - 4	-.0121		.0909	READING ACHIEVEMENT
			-.0732	TOTAL READING
RAMOS - 1	.2992	APPLE #3	-.1091	READING COMPREHENSION
RAMOS - 2	-.0271		.1231	READING APPLICATION
RAMOS - 3	.0259		-.0126	DECODING
RAMOS - 4	-.0981		-.0655	READING ACHIEVEMENT
			-.0007	TOTAL READING

Table 9.7

Path Coefficients for Paths from APPLE Variables to Pupil Behavior Variables to Outcomes; Grade 2 Reading (N = 40)

TEACHING PERFORMANCE (APPLE 5 - 14)		STUDENT BEHAVIOR	OUTCOME MEASURES (READING)	
APPLE - 5	-.0349		-.0844	READING COMPREHENSION
APPLE - 6	.5007	A		
APPLE - 7	.3833	P	.1536	READING APPLICATION
APPLE - 8	-.1045	P		
APPLE - 9	.0872	L	.2777	DECODING
APPLE - 10	.1265	E		
APPLE - 11	.0731		.0273	READING ACHIEVEMENT
APPLE - 12	.2070	#1		
APPLE - 13	-.1982		.1706	TOTAL READING
APPLE - 14	.0665			

APPLE - 5	.1717		-.2022	READING COMPREHENSION
APPLE - 6	-.0377	A		
APPLE - 7	-.6659	P	.0221	READING APPLICATION
APPLE - 8	.0576	P		
APPLE - 9	-.1744	L	.0361	DECODING
APPLE - 10	-.3535	E		
APPLE - 11	.2255		.0909	READING ACHIEVEMENT
APPLE - 12	-.2308	#2		
APPLE - 13	.6990		-.0732	TOTAL READING
APPLE - 14	.4243			

Table 9.7 (Continued)

TEACHING PERFORMANCE (APPLE 5 - 14)		STUDENT BEHAVIOR	OUTCOME MEASURES (READING)	
APPLE - 5	.2312		- .1091	READING COMPREHENSION
APPLE - 6	.2415	A		
APPLE - 7	.2523	P	.1231	READING APPLICATION
APPLE - 8	.0656	P		
APPLE - 9	.5272	L	- .0126	DECODING
APPLE - 10	.0691	E		
APPLE - 11	-.1687		- .0655	READING ACHIEVEMENT
APPLE - 12	.3941	#3		
APPLE - 13	-.1734		- .0007	TOTAL READING
APPLE - 14	-.1717			

paths with coefficients that meet our criterion for consideration. AP-6 is a context variable in which the teacher organizes the class into groups and teaches in the group; whereas AP-7 is a variable measuring the frequency with which the teacher teaches the class-as-a-whole.

We have two context variables, AP-6 and AP-7, both related to pupil productivity, AP-1. We have a picture, therefore, of a teacher who uses both the class-as-a-whole and the class in groups as teaching contexts. And we know that the teacher's conceptualization of instruction is more sophisticated (WD-3). We have also seen that the use of a variety of materials by itself (R-3) has a negative relationship to pupil productivity (AP-1).

Consider now AP-2 which is a measure of inattentiveness. First, AP-2 does not have significant paths to any of the outcome measures (the word significant in this context means pc $\geq$ .25). One should note the relative magnitude of the path from AP-2 to reading comprehension where pc = -.20, thus suggesting that inattentiveness is most likely to have its effect upon reading comprehension. But a reasonable and conservative conclusion is that the general level of pupil inattentiveness during reading activities in and of itself is not a predictor of achievement in reading.

In the paths from teaching performance variables to pupil behavior variables there are some indicators of performances which influence pupil inattentiveness. WD-2, for example, is negatively related to inattentiveness (pc = -.48), WD-4 and WD-5 are positively related to

inattentiveness (pc = .27 and .47 respectively). The pc for R-1 to AP-2 is - .33, and for R-2 is .33. AP-7 and AP-10 are both negatively related to AP-2 (pc = -.67 and -.35 respectively), while AP-13 and AP-14 are positively related to AP-2 (pc = .70 and .42 respectively).

WD-2 is a measure of the range of content, and the negative path coefficient indicates the more content the teacher is covering the lower the level of pupil inattentiveness. WD-4 is a measure of the variety of instructional contexts, weighted by the proportion of pupils the teacher is actually instructing and it is positively related to pupil inattentiveness. This relation suggests that it may be the number and types of contexts in which the teacher is instructing as well as the proportion of pupils the teacher is actually instructing that is a critical combination. We have already seen, for example, that AP-6 (teacher-directed group activities) and AP-7 (teacher directing the whole class) have positive relations with AP-1 (pupil productivity). Similarly, WD-5 (variety of materials) has a positive relationship with inattentiveness. We have discussed previously the hypothesis that the variety of materials may contribute or may hinder or interfere with learning depending upon the teacher's ability to organize the instruction when he or she is using a variety of materials.

R-1, which has a negative relationship with AP-2, is a variable that measures the observed amount of time the teacher spends instructing and managing instruction in the classroom. R-2 is a variable which

measures the variety of instructional goals, but primarily reflects pupil time spent practicing skills. It is positively related to inattentiveness suggesting a picture of a teacher whose pupils are spending a great deal of time practicing skills for lessons that had been insufficiently organized. AP-7 (teacher directing the whole class) which we have seen previously as positively related to pupil productivity, is negatively related to inattentiveness (AP-2). Note also that AP-10, sustained instructional interactions, or developing pupil understanding, is negatively related to inattentiveness.

AP-7, a context variable, and AP-10, an instructional variable, here are both related negatively to inattentiveness which suggests a picture of a teacher teaching the class-as-a-whole using goal-directed, topic-oriented and sustained instructional techniques. The combination seems to be an effective way of reducing pupil inattentiveness. The high positive path coefficients for AP-13 (social control) and AP-14 (ignoring pupil behavior) reflect teachers using control techniques; where more pupil inattentiveness is occurring, one is more likely to see instances of both AP-13 and AP-14.

Consider now AP-3 (attentive, on-task pupil behavior). The path coefficients between AP-3 and outcome measures are all relatively small. The conclusion to be drawn is attentiveness (AP-3) is not in itself directly related to the learning of reading at the second grade level. Again we find that teaching performances are related to AP-3.

WD-1 (pc = .49), WD-3 (pc = -.35) and WD-5 (pc = -.45); R-1 (pc = .30), AP-7 (pc = .25), AP-9 (pc = .53), and AP-12 (pc = .39) are all related to AP-3. WD-1 is a measure of the amount of time spent preparing for and teaching; it is an instructional time variable. WD-1 has a substantial positive path coefficient which suggests that engaging in teaching is itself a way of maintaining attentiveness. (Note the negative path coefficient between WD-1 and AP-2 which did not meet our criterion for consideration.) The negative path coefficient of WD-3 is surprising. WD-3 is an indirect measure of the strategies, pupil activities and materials used for the skills taught which is an index of the complexity of the teacher's conceptualization of the instructional design. It may be that teachers who have complex methodologies in mind for teaching have somewhat less attentiveness in their classes. The reader, however, should keep in mind that, in making inferences of this kind, a variable like WD-3 should be considred in relation to other variables. We have found WD-3 to be a positive predictor of pupil productivity and learning, but it is not necessariiy a positive predictor of pupil attentiveness. We will return to this fact again in summarizing and intepreting the results presented in this section.

WD-5, the use of a variety of materials, has a negative relation, a result we have noted frequently. R-1 is a measure of time spent in instructing and monitoring and in this respect is like WD-1 which also had a positive and substantial path coefficient for the path to

AP-3. AP-7 is a context variable, teaching the class-as-a-whole, which is positively related to attentiveness, and recall that it was negatively related to AP-2 (inattentiveness). Notice that the other two context variables, AP-5 (independent pupil work), and AP-6 (teacher-directed group work) are very close to our criterion for inclusion in this discussion, and are also positive predictors of AP-3.

AP-9 is an instructional variable which represents the interactive style in which the teacher asks questions and responds to questions of students, but this type of questioning is not focused or sustained questioning such as is represented in AP-10. AP-12 is similar to AP-9, but AP-12 teacher behavior occurs in response to a pupil behavior. AP-12 is marked in the coding system if a child asks a question and the teacher responds to that question by asking a question or by giving some brief instructions; the category also includes those instances of positive feedback or praise that occur when a child responds. High scores on AP-9 and AP-12 are indicators of a teacher who is interacting frequently with students.

We see in these data a picture of a teacher who spends considerable time teaching and monitoring and who organizes the class in groups, or the class-as-a-whole, or by letting the pupils work independently, but who maintains pupil attentiveness by a high level of interaction with the students in all of these contexts.

Summary of Grade 2 - Reading

The results of these analyses can be summarized by listing the teaching performance variables that had positive and negative path coefficients with AP-1, AP-2 and AP-3. This list is provided below:

Pupil Productivity		Inattentive Behavior		On-Task Behavior	
AP-1		AP-2		AP-3	
+	-	+	-	+	-
				WD-1	
			WD-2		
WD-3					WD-3
		WD-4			
		WD-5			WD-5
			R-1	R-1	
		R-2			
	R-3				
AP-6					
AP-7			AP-7	AP-7	
				AP-9	
			AP-10		
				AP-12	
		AP-13			
		AP-14			

Consider first AP-1, a measure of pupil productivity. Context variables AP-6 and AP-7, and the concepts of the instructional design (WD-3), have positive relations with AP-1. Note that AP-7 (teaching the class-as-a-whole) has a negative relation with AP-2 (inattentiveness) and a positive relation with AP-3 (attentiveness). The reader may be

somewhat surprised by the fact that this context variable has these seemingly opposite relations. A hint of an explanation may be found by observing that AP-10 occurs with AP-7 where both have negative relations with AP-2, inattentiveness, and AP-9 occurs with AP-7 where both have positive relations with AP-3, attentiveness. Recall that AP-9 and AP-10 are interactive instructional activities. We suspect that when the teacher groups the class-as-a-whole (AP-7) a significant amount of interaction between the teacher and the student occurs.

Note also that variety of materials (R-3) is negatively related to pupil productivity (AP-1); and that variety of materials (WD-5) is positively related to inattentiveness (AP-2) and negatively related to on-task behavior (AP-3). Running through all these data is a relatively consistent result, that variety of materials in and of itself may be associated with less effective learning. At this point the variety of materials variable is generally related to a lack of pupil productivity, a lack of on-task behavior and to inattentiveness. Therefore, the effect of the variety of materials is not necessarily on the learning but on the pupil task-orientation variables, which also affect learning. One suspects that the teacher's ability to organize instruction when using a variety of materials is a critical factor influencing effective learning.

A general picture presented by these data is that when a teacher organizes effectively for instruction, interacts frequently with students, and devotes much of the teaching time to instruction, productivity increases, attentiveness increases, and inattentiveness decreases.

We have, however, in this analysis learned a very important fact. Only AP-1 of the three pupil behavior variables is directly related to an outcome measure. The two pupil behaviors related to attending, AP-2 and AP-3, do not have direct effects upon learning skills. This result is not surprising if one considers that task-orientation variables may be necessary for learning but are not sufficient conditions for increasing learning.

Grade 5 - Reading

We present in this section an analysis similar to that presented in the preceding section. Tables 9.8, 9.9 and 9.10 present two kinds of information; first, the relation of the pupil behavior variables to learning, and second, the relation of teaching performance variables to the pupil behavior variables.

Consider first AP-1, pupil productivity. This variable has no substantial path coefficients for the paths between it and the outcome measures. This is true even for decoding which when regressed on teaching performances produced a significant R. Thus, it is reasonable to conclude that pupil productivity, AP-1, is not significantly related to student learning at least at the fifth grade in reading.

Only two teaching performance variables are related to AP-1, R-3 (variety of materials, pc = -.27) and AP-6 (teacher-directed group activities, pc = .63). Note that WD-1 (teaching time) approaches our criterion level (pc = .24).

Table 9.8

Path Coefficients for Paths from Work Diary Variables to Pupil Behavior Variables to Outcomes; Grade 5 Reading (N = 53)

TEACHING PERFORMANCE		STUDENT BEHAVIOR	STUDENT OUTCOMES (READING)	
WD - 1	.2409	APPLE #1	.0414	READING COMPREHENSION
WD - 2	- .0332		-.0439	READING APPLICATION
WD - 3	.0141		.0044	DECODING
WD - 4	.1062		.0058	READING ACHIEVEMENT
WD - 5	- .1573		-.0908	TOTAL READING
WD - 1	- .0255	APPLE #2	-.0343	READING COMPREHENSION
WD - 2	.0007		-.3677	READING APPLICATION
WD - 3	.1460		.0965	DECODING
WD - 4	- .1777		-.1099	READING ACHIEVEMENT
WD - 5	- .0335		-.3677	TOTAL READING
WD - 1	- .1224	APPLE #3	.1824	READING COMPREHENSION
WD - 2	.3622		-.3012	READING APPLICATION
WD - 3	- .1939		-.0137	DECODING
WD - 4	.0903		-.0807	READING ACHIEVEMENT
WD - 5	.1195		-.2397	TOTAL READING

Table 9.9

Path Coefficients for Paths from RAMOS Variables to Pupil Behavior to Outcomes; Grade 5 Reading (N = 53)

TEACHING PERFORMANCE		STUDENT BEHAVIOR	STUDENT OUTCOMES (READING)	
R - 1	.1947	APPLE #1	.0414	READING COMPREHENSION
R - 2	.0650		-.0439	READING APPLICATION
R - 3	- .2724		.0044	DECODING
R - 4	.1181		.0058	READING ACHIEVEMENT
			-.0698	TOTAL READING
R - 1	.1652	APPLE #2	-.0348	READING COMPREHENSION
R - 2	.2208		-.3677	READING APPLICATION
R - 3	- .3138		.0965	DECODING
R - 4	.0091		-.1099	READING ACHIEVEMENT
			-.3677	TOTAL READING
R - 1	- .0425	APPLE #3	.1824	READING COMPREHENSION
R - 2	- .1847		-.3012	READING APPLICATION
R - 3	.3093		-.0137	DECODING
R - 4	- .1206		-.0807	READING ACHIEVEMENT
			-.2397	TOTAL READING

Table 9.10

Path Coefficients for Paths From APPLE Variables to Pupil Behavior to Outcomes; Grade 5 Reading (N = 53)

TEACHING PERFORMANCE		STUDENT BEHAVIOR	STUDENT OUTCOMES (READING)	
APPLE - 5	- .0421			
APPLE - 6	.6342			
APPLE - 7	.2048	A	.0414	READING COMPREHENSION
APPLE - 8	- .0310	P	-.0439	READING APPLICATION
APPLE - 9	.0370	P	.0044	DECODING
APPLE - 10	- .0357	L	.0058	READING ACHIEVEMENT
APPLE - 11	.0055	E	-.0208	TOTAL READING
APPLE - 12	.0980			
APPLE - 13	.1890	#1		
APPLE - 14	- .0368			

APPLE - 5	.4628			
APPLE - 6	.0994			
APPLE - 7	.2116	A	-.0343	READING COMPREHENSION
APPLE - 8	.1209	P	-.3677	READING APPLICATION
APPLE - 9	- .0156	P	.0965	DECODING
APPLE - 10	- .0358	L	-.1099	READING ACHIEVEMENT
APPLE - 11	.1543	E	-.3677	TOTAL READING
APPLE - 12	- .3335			
APPLE - 13	.1574	#2		
APPLE - 14	.1378			

Table 9.10 (Continued)

TEACHING PERFORMANCE		STUDENT BEHAVIOR	STUDENT OUTCOMES (READING)
APPLE - 5	- .0358		
APPLE - 6	.2383		
APPLE - 7	.0958	A	.1824 READING COMPREHENSION
APPLE - 8	- .0347	P	-.3012 READING APPLICATION
APPLE - 9	.1284	P	-.0137 DECODING
APPLE - 10	.0863	L	-.0807 READING ACHIEVEMENT
APPLE - 11	- .0269	E	-.2397 TOTAL READING
APPLE - 12	.1774		
APPLE - 13	- .1410	#3	
APPLE - 14	.2316		

Consider now the AP-2 variable (inattentive behavior). AP-2 has a substantial path coefficient to reading application (pc = -.37) and to total reading (pc = -.37). As we saw in Table 9.1 the only significant R produced at grade 5 reading was for the regression of decoding scores on teaching performances; however, note that in Table 9.2 the substantial r's between decoding scores and reading application scores and between reading application and the total reading scores.

Among the teaching performance variables R-3 (pc = -.31), AP-5 (pc = .46) and AP-12 (pc = -.33) have substantial path coefficients for the paths to AP-2. R-3, the use of a variety of materials, has a negative relation with AP-2, suggesting that the greater the variety of materials used the less pupil inattentiveness. But as we have noted before, we suspect that a relation of this kind occurs when the teachers can effectively organize the use of a variety of materials. AP-5 is independent pupil work and, as might be expected, there is a positive and substantial relation between this kind of teaching performance and inattentiveness. AP-12 indicates the responsiveness of the teacher to individual students; higher scores mean that the teacher responds more when students ask questions and gives more feedback when they give answers. Such a performance is inversely related to the amount of pupil inattentiveness.

Consider now the relations of the teaching performances to AP-3, pupil on-task behaviors. There are negative path coefficients for the paths from AP-3 to reading application and to total reading (the latter not quite at the level we chose to include in the discussion). Generally this negative relation might be interpreted

to mean that attentiveness is inversely related to learning; however, this result is surprising. One explanation is that the measure of observed pupil attentiveness is picking up conformity-types of attentiveness, and that the students are not really attending in their minds.

WD-2 (pc = .36) and R-3 (pc = .31) are the only teaching performance variables which have substantial path coefficients for the paths to AP-3. WD-2 is the range of content covered and is a proxy for instructional effort or investment on the part of the teacher, and R-3 is a variety of materials. Note that two APPLE variables, AP-6 (teacher-led groups), and AP-14 (mildly negative form of social control) are close to our criterion for inclusion and are positive predictors of pupil attentiveness.

Summary of Grade 5 - Reading

At fifth grade level in reading, pupil productivity (AP-1) has no substantial relationship to learning outcomes. AP-2 (inattentiveness) is negatively related to reading application and total reading. AP-3 (attentiveness) is negatively related to reading application. The three pupil behaviors are not notably good predictors of the learning outcomes. The negative path coefficient for the path between AP-3 and reading application is surprising and suggests that the high scores on AP-3 are not indicators of learning. When we consider that AP-1 also has small relations to outcomes, we may conclude that the critical factor in pupil behavior is the level of inattention rather than the level of attention and observable productivity.

The teaching performances are organized in terms of their relationships with the pupil behaviors in the listing below.

Pupil Productivity		Inattentive Behaviors		On-Task Behaviors	
AP-1		AP-2		AP-3	
+	-	+	-	+	-
	R-3		R-3	WD-2	
		AP-5		R-3	
AP-6					
		AP-12			

Note that R-3 is negatively related to pupil productivity. Its negative relation to inattentiveness means that in general, the greater the variety of material the less the inattentiveness. That relation is substantiated by the positive relation between variety of materials and attentiveness (AP-3). The use of a variety of materials seems to be acting as a variable that positively influences attending behavior but has relatively little influence on productivity.

Two variables that we have seen before related to pupil behavior appear here also, AP-6 (teacher group) and AP-12 (direct instructional responses to students). The reader should note that AP-5, unsupervised and independent pupil work, appears here as in many other analyses as a negative predictor. A substantial amount of this kind of teaching strategy seems to be generally ineffective. Here we see only its influence on inattentiveness, and so are unable to offer a comprehensive explanation for the influence of this variable.

Independent seatwork which is unsupervised is a teaching context that fosters inattention; therefore, in the multiple regression analyses, AP-5 generally turns up as a negative predictor of these pupil achievement scores. In general, a higher level of pupil inattentiveness will be associated with lower scores.

Grade 2 - Mathematics

We will describe the relation of the pupil behavior, of AP-1 to learning outcomes in mathematics, and the relation of teaching performances to AP-1 (pupil productivity). These data are presented in Tables 9.11 to 9.13. AP-1 has no substantial relations with mathematics learning outcomes. The teaching performance variables which predict AP-1 are R-2 (pc = .41), AP-7 (pc = .40), AP-9 (pc = -.26) and AP-12 (pc = .26). Note that AP-13 has a pc = .24 and that R-3 has a pc = -.24. This pattern of relations suggests a picture of a teacher who is teaching the class-as-a-whole (AP-7), providing skills practice (R-2), and is responsive to individual pupils during instructional activities (AP-12). Such a teacher is not as frequently using questions to monitor pupil progress (AP-9). These patterns are related to high scores on AP-1 (pupil productivity).

AP-2 (pupil inattentiveness) also has insubstantial relations with the learning outcomes in grade 2 mathematics. The teaching performance variables that predict AP-2 are WD-1 (pc = .32), WD-2 (pc = .46), WD-4 (pc = -.45), R-4 (pc = -.48), AP-5 (pc = .46), AP-6 (pc = -.39), AP-9 (pc = -.65) and AP-13 (pc = .33).

Table 9.11

Path Coefficients for Paths from Work Diary Variables to Pupil Behavior to Outcomes: Grade 2 Mathematics (N = 41)

TEACHING PERFORMANCE		STUDENT BEHAVIOR	STUDENT OUTCOMES (MATHEMATICS)	
WD - 1	.0966	APPLE #1	.0997	CONCEPTS
WD - 2	.0610		.0563	COMPUTATION
WD - 3	-.0293		.2081	APPLICATIONS
WD - 4	-.1153		.1679	TOTAL MATHEMATICS
WD - 5	-.0717			
WD - 1	.3165	APPLE #2	-.0520	CONCEPTS
WD - 2	.4643		.0207	COMPUTATION
WD - 3	.0725		.1836	APPLICATIONS
WD - 4	-.4516		.0852	TOTAL MATHEMATICS
WD - 5	-.1781			
WD - 1	-.1788	APPLE #3	.2141	CONCEPTS
WD - 2	-.0489		-.2229	COMPUTATION
WD - 3	-.1185		.0654	APPLICATIONS
WD - 4	.0656		-.0797	TOTAL MATHEMATICS
WD - 5	.0910			

Table 9.12

Path Coefficients for Paths from RAMOS Variables to Pupil Behavior to Outcomes: Grade 2 Mathematics (N = 41)

TEACHING PERFORMANCE		STUDENT BEHAVIOR	STUDENT OUTCOMES (MATHEMATICS)	
R - 1	.0166	APPLE #1	.0997	CONCEPTS
R - 2	.4140		.0563	COMPUTATION
R - 3	-.2387		.2081	APPLICATIONS
R - 4	.0023		.1679	TOTAL MATHEMATICS
R - 1	.2372	APPLE #2	-.0520	CONCEPTS
R - 2	.0562		.0207	COMPUTATION
R - 3	.0502		.1836	APPLICATIONS
R - 4	-.4848		.0852	TOTAL MATHEMATICS
R - 1	-.5260	APPLE #3	.2141	CONCEPTS
R - 2	-.2801		-.2229	COMPUTATION
R - 3	.6231		.0654	APPLICATIONS
R - 4	.4930		-.0797	TOTAL MATHEMATICS

Table 9.13

Path Coefficients for Paths from APPLE Variables to Pupil Behavior to Outcomes: Grade 2 Mathematics (N = 41)

TEACHING PERFORMANCE		STUDENT BEHAVIOR	STUDENT OUTCOMES (MATHEMATICS)	
APPLE - 5	-.0451			
APPLE - 6	.1792			
APPLE - 7	.3954	A	.0997	CONCEPTS
APPLE - 8	-.0274	P	.0563	COMPUTATION
APPLE - 9	-.2611	P	.2081	APPLICATIONS
APPLE - 10	-.1344	L	.1679	TOTAL MATHEMATICS
APPLE - 11	-.2172	E		
APPLE - 12	.2560			
APPLE - 13	.2439	#1		
APPLE - 14	.0951			
APPLE - 5	.4652			
APPLE - 6	-.3948			
APPLE - 7	.0345	A	-.0520	CONCEPTS
APPLE - 8	.0927	P	.0207	COMPUTATION
APPLE - 9	-.6486	P	.1836	APPLICATIONS
APPLE - 10	.2237	L	.0852	TOTAL MATHEMATICS
APPLE - 11	-.1197	E		
APPLE - 12	.0458			
APPLE - 13	.3295	#2		
APPLE - 14	.2346			

Table 9.13 (continued)

TEACHING PERFORMANCE		STUDENT BEHAVIOR	STUDENT OUTCOMES (MATHEMATICS)	
APPLE - 5	.1246			
APPLE - 6	.4940			
APPLE - 7	.1812	A		
APPLE - 8	.1203	P	.2141	CONCEPTS
APPLE - 9	.5200	P	-.2229	COMPUTATION
APPLE - 10	.0740	L	.0654	APPLICATIONS
APPLE - 11	.3377	E	-.0797	TOTAL MATHEMATICS
APPLE - 12	-.1349			
APPLE - 13	-.4904	#3		
APPLE - 14	.0026			

WD-1 (teaching time) and WD-2, a measure of the variety of content covered, relate positively to pupil inattentiveness. The teacher who is trying to cover a variety of content has a complex instructional situation to manage, and has difficulties in managing it, and may have greater inattentiveness among the pupils. WD-4 is an index of the variety of instructional contexts in a classroom. A high score may reflect a large proportion of pupils taught by the teacher in different contexts. The negative relation of WD-4 to AP-2; the positive relation of AP-5 (independent work) with inattentiveness, but the negative relation of R-4 (independent seatwork) with AP-2; and, the negative relation of AP-6 (teacher-group) with inattentiveness suggest a diverse set of relations. R-4 (independent seatwork) and AP-5 (work independent of adult supervision) differ from each other in the level of interaction with the teacher. R-4 is supervised independent work; AP-5 is unsupervised independent work.

This pattern of opposite relations is interesting. One can visualize the situation in which the teacher permits the students to work by themselves, does not supervise them closely (AP-5) and, in effect, is spending most of his or her teaching time with pupils in this kind of activity. Such a pattern is likely to be related to a higher level of inattentiveness. Whereas if the teacher groups the students to teach them (AP-6) and monitors pupil progress (AP-9), inattentiveness is lower. The positive correlation between AP-13 (social control) and AP-2 reflects the instances of teachers who attempt to cope with inattentive behavior on the part of the pupils by redirecting them to the instructional

task. Ordinarily this teaching behavior would be expected to decrease inattentiveness. But we should remember that the general level of inattentiveness is relatively constant and a high AP-13 score probably means that some teachers, more than others, are attempting to cope with pupil inattentiveness.

AP-3 has relatively insubstantial relations with outcomes although the path coefficients for the paths from AP-3 to concepts and to computation approach our criterion level. The predictors of AP-3 are R-1 (pc = -.53), R-2 (pc = -.28), R-3 (pc = .62) and R-4 (pc = .49), AP-6 (pc = .49), AP-9 (pc = .52), AP-11 (pc = .34) and AP-13 (pc = -.49). The four RAMOS variables are all predictors, two of them positive and two negative. R-1 is the amount of time the instructor spends instructing and facilitating. R-2 is the time spent acquiring skills.

On the other hand, R-3, variety of materials, and R-4, time spent in supervised seatwork, relate positively to pupil attentiveness. It appears that a variety of materials may keep second grade pupils involved while doing seatwork. We see other ways in which the teacher may maintain attentiveness: by teaching in groups (AP-6), by monitoring pupil progress (AP-9) and by changing location in the classroom (AP-11). The negative relation of AP-13 to AP-3 is surprising. The negative sign indicates that high scores on AP-13 (social control) will predict low scores on attentiveness. It may be that teachers who exercise a great deal of social control to keep students on tasks (even if they are mostly redirecting behaviors) have a corresponding

decrease in impact on pupil attentiveness. The multiple regression analyses usually showed AP-13 to be a significant positive predictor of learning. We see in this result the effect of AP-13 considered in the context of its relations with other teaching performances. It may be that combinations of AP-13 with other teaching performances such as AP-5 (independent work) or AP-8 (organizing) is an ineffective teaching performance for maintaining attending behavior. The other possibility is that the direction of causality is from inattentiveness to social control.

Summary of Grade 2 - Mathematics

The three pupil behavior variables are not very good predictors of pupil learning outcomes in second grade mathematics. The positive and negative predictors of AP-1, AP-2 and AP-3 are listed below:

Pupil Productivity AP-1		Inattentive Behavior AP-2		Attentive Behavior AP-3	
+	-		-	+	-
	AP-9	WD-1			
		WD-2			
			WD-4		
					R-1
R-2					R-2
				R-3	
			R-4	R-4	
		AP-5			
			AP-6	AP-6	
AP-7					
			AP-9	AP-9	
				AP-11	
AP-12					
		AP-13			AP-13

Productivity is predicted by two variables which are measures of the instructional activity of the teacher, R-2 and AP-12, and by a context variable, AP-7. This is a picture of a teacher leading the class-as-a-whole while pupils are: practicing skills, and being responsive in this to individual students. Monitoring pupil progress in unsustained instructional behaviors (AP-9) is negatively associated with pupil productivity. Inattentiveness is predicted by AP-5 (independent seatwork), WD-1 (teaching time), WD-2 (variety of skills taught), and AP-13 (social control). It may be that these performances in combination are ineffective in the sense that they lead to more inattentiveness, which one would predict generally would be associated with lower mathematics scores, other things being equal. (Note that we cannot claim that inattentiveness in itself is a predictor of poor achievement.) This speculation is substantiated by the fact that a teaching context variable, AP-6, a variety of contexts variable, WD-4, and an instructional variable, AP-9, are negatively related to inattentiveness. R-4, supervised independent seatwork, is positively related to attending and negatively related to inattending.

R-3 (variety of instructional material) is also related positively to attending behavior. We see again that the teacher-group context (AP-6), the monitoring pupil progress variable, (AP-9), the mobility variable (AP-11), are positively related to attending. It is not difficult to hypothesize that if the teacher uses independent work with a variety of materials and instructs in this arrangement, pupils

remain on-task, that is, show more attentive behavior. Similarly, if the teacher groups the students and uses a variety of materials and also interacts responsively with the students in this context, attending behavior is increased.

Looking across the array of positive and negative predictors in this list, one sees that the context variables and the instructional variables are generally positive predictors of desirable pupil behavior, or negative predictors of undesirable pupil behavior. R-2 is a measure of the time pupils spend acquiring and practicing skills. It is generally associated with productivity but is also associated with lower attentiveness. The teacher, by increasing the amount of pupil skills-practice time, increases the difficulty of maintaining attention. Therefore we see AP-13 (social control) appearing with a negative path coefficient for attentiveness, and a positive coefficient for inattentiveness.

Grade 5 - Mathematics

The reader will recall that it was in grade 5 mathematics that we obtained the most significant R's, three in number (see Table 9.3). Tables 9.14, 9.15 and 9.16 present the relations of the pupil variables to outcomes. As can be seen by reading down the right-hand side of any table, there are a number of substantial path coefficients between pupil behavior and learning outcomes in mathematics in grade 5.

Table 9.14

Path Coefficients for Paths from Work Diary Variables to Pupil Behavior to Outcomes: Grade 5 Mathematics (N = 54)

TEACHING PERFORMANCE		STUDENT BEHAVIOR	STUDENT OUTCOMES (MATHEMATICS)	
WD - 1	.1439	APPLE #1	-.2722	CONCEPTS
WD - 2	.4882		-.1244	COMPUTATION
WD - 3	-.2663		-.0587	APPLICATIONS
WD - 4	-.2648		-.1494	TOTAL MATHEMATICS
WD - 5	.1655			
WD - 1	-.1685	APPLE #2	-.2341	CONCEPTS
WD - 2	-.0227		-.4632	COMPUTATION
WD - 3	.1390		-.3905	APPLICATIONS
WD - 4	-.1878		-.4909	TOTAL MATHEMATICS
WD - 5	.0783			
WD - 1	-.0435	APPLE #3	.0544	CONCEPTS
WD - 2	-.1583		-.2953	COMPUTATION
WD - 3	.0456		.1000	APPLICATIONS
WD - 4	.2203		.0009	TOTAL MATHEMATICS
WD - 5	-.1795			

Table 9.15

Path Coefficients for Paths from RAMOS Variables to Pupil Behavior to Outcomes: Grade 5 Mathematics (N = 54)

TEACHING PERFORMANCE		STUDENT BEHAVIOR	STUDENT OUTCOMES (MATHEMATICS)	
R - 1	.3483	APPLE #1	-.2722	CONCEPTS
R - 2	-.4768		-.1244	COMPUTATION
R - 3	.4650		-.0587	APPLICATIONS
R - 4	-.2083		-.1494	TOTAL MATHEMATICS
R - 1	.0922	APPLE #2	-.2341	CONCEPTS
R - 2	.0782		-.4632	COMPUTATION
R - 3	.2690		-.3905	APPLICATIONS
R - 4	-.4200		-.4909	TOTAL MATHEMATICS
R - 1	-.1140	APPLE #3	.0544	CONCEPTS
R - 2	-.1109		-.2953	COMPUTATION
R - 3	.1301		.1000	APPLICATIONS
R - 4	.1988		.0009	TOTAL MATHEMATICS

Table 9.16

Path Coefficients for Paths from APPLE Variables to Pupil Behavior to Outcomes: Grade 5 Mathematics (N = 54)

TEACHING PERFORMANCE		STUDENT BEHAVIOR	STUDENT OUTCOMES (MATHEMATICS)	
APPLE - 5	-.1747			
APPLE - 6	.0318			
APPLE - 7	-.0544			
APPLE - 8	.1053	A	-.2722	CONCEPTS
APPLE - 9	.1335	P	-.1244	COMPUTATION
APPLE - 10	.0364	P	-.0587	APPLICATIONS
APPLE - 11	.0291	L	-.1494	TOTAL MATHEMATICS
APPLE - 12	.2982	E		
APPLE - 13	-.0149	#1		
APPLE - 14	.0482			

APPLE - 5	.4985			
APPLE - 6	-.3187			
APPLE - 7	-.1106			
APPLE - 8	-.1372	A	-.2341	CONCEPTS
APPLE - 9	-.3577	P	-.4632	COMPUTATION
APPLE - 10	-.0056	P	-.3905	APPLICATIONS
APPLE - 11	-.1183	L	-.4909	TOTAL MATHEMATICS
APPLE - 12	.3857	E		
APPLE - 13	.0446			
APPLE - 14	.2697	#2		

Table 9.16 (continued)

TEACHING PERFORMANCE		STUDENT BEHAVIOR	STUDENT OUTCOME (MATHEMATICS)	
APPLE - 5	-.1330			
APPLE - 6	.4141			
APPLE - 7	.3713			
APPLE - 8	.3897	A P P L E #3	.0544	CONCEPTS
APPLE - 9	.0821		-.2953	COMPUTATION
APPLE - 10	.0412		.1000	APPLICATIONS
APPLE - 11	.2264		.0009	TOTAL MATHEMATICS
APPLE - 12	-.1508			
APPLE - 13	-.0682			
APPLE - 14	.0071			

AP-1, pupil productivity, has a negative path coefficient for the path from it to concepts. Note, however, that nine of the 12 path coefficients between the pupil behavior variables and outcomes are negative, of which five have path coefficients of sufficient magnitude to meet our criterion for consideration. While three associated with AP-2, pupil inattentive behavior, do not surprise us, the negative path coefficient for the path from AP-1 to outcomes and the negative coefficient for the path from AP-3 are difficult to understand.

The predictors of AP-1 are WD-2 (pc = .49), WD-3 (pc = -.27), WD-4 (pc = - .26), R-1 (pc = .35), R-2 (pc = -.48), R-3 (pc = .46) and AP-12 (pc = .30). We will discuss these variables after we have summarized all the relations between teaching performances and pupil behavior. AP-2, inattentive behavior, generally has negative path coefficients between it and the learning outcomes. This result is not surprising since it would imply that the greater the degree of pupil inattentiveness the lower the learning scores. This is one of the few instances where we have seen a consistent result; that is, the pupil behavior variable had path coefficients to outcomes which all had the same sign and where the magnitude was substantial. (Even the one path coefficient we are not considering here approaches our criterion level.)

The predictors of AP-2 are R-3 (pc = .27), R-4 (pc = -.42), AP-5 (pc = .50), AP-6 (pc = -.32), AP-9 (pc = -.36), AP-12 (pc = .39) and AP-14 (pc = .27). We have seen this pattern of predictors previously.

In general, independent work (AP-5), is related to greater inattentiveness, whereas, the teacher-group context (AP-6), and instructional variables such as those associated with AP-9, monitoring pupil progress, are negatively related to inattentiveness. AP-12 and AP-14, both responsive variables, show up as positive predictors of inattention. The teacher may simply increase the amount of performance on these variables when inattentiveness occurs; it is possible that an increase in a variable such as AP-12, responsiveness to pupils, may place greater demands on students to attend when they have difficulty maintaining attention.

AP-3 (attentiveness) is negatively related to computation scores. This relation may reflect the fact that it is simply more difficult to keep children attending to computation tasks and the consequence is lower computation scores. It is useful to recognize here that attending during computation may be an indicator of the degree to which learning is likely to occur.

The predictors of AP-3 are AP-6, AP-7 and AP-8. Note that AP-11, teacher mobility, is near our criterion for inclusion. AP-6, (pc = .41) and AP-7, (pc = .37) are both context variables. A conclusion seems to be that these are contexts in which it is simply easier to maintain attention, an observation corroborated by the negative path coefficient of AP-5 (independent pupil work) which we have not considered because of its smaller magnitude. AP-8's positive path coefficient, pc = .39, is the only instance in all the analyses in which a coefficient associated with AP-8 has shown up as positive. What we probably have learned by doing the path analysis is that teacher organizing behavior

(AP-8) is effective for maintaining pupil attending behavior. But, since attending behavior is a necessary but not a sufficient condition for learning, more time spent organizing instruction reduces the amount of time for instruction. Therefore, we generally find AP-8 is a negative predictor of learning outcomes. The effect of the teaching performance (AP-8) is on attentiveness but not on learning. If the teacher is not providing sufficient instruction because he or she is devoting more time to organizing than instruction, then less learning occurs.

Summary of Grade 5 - Mathematics

The AP-2 variable, inattentiveness, showed the strongest relation to learning outcomes, and in the direction that one would expect. AP-1, productivity, and AP-3, attentiveness, each have a single significant negative path coefficient with learning outcomes. In the case of AP-1, we suspect the variable is not an indicator of what students are learning but may be more an indicator of the teacher's ability to keep the students involved in the task. In the case of AP-3, we suspect that AP-3 is an indicator of the difficulty of maintaining attending behavior when computational tasks are the tasks of instruction.

We list below the variables that had positive and negative path coefficients for each of the pupil behavior variables.

Pupil Productivity		Inattentive Behavior		Attentive Behavior	
AP-1		AP-2		AP-3	
+	-	+	-	+	-
WD-2					
	WD-3				
	WD-4				
R-1					
	R-2				
R-3		R-3			
			R-4		
		AP-5			
			AP-6	AP-6	
				AP-7	
				AP-8	
			AP-9		
AP-12		AP-12			
		AP-14			

As can be seen from this list, productivity is positively related to the amount of content covered and the variety of materials used (WD-2 and R-3), to responsiveness to individual pupils (AP-12), and to time spent in instructional and monitoring roles (R-1). Negative predictors are the teachers' concept of the complexity of the instructional design (WD-3), variety of the instructional contexts (WD-4), and the time pupils spend practicing and acquiring skills (R-2). The negative path coefficient of WD-3 is surprising since generally this is a measure of a more comprehensive methodology and WD-3 has usually appeared as a positive predictor in the regression analyses reported in chapters 7 and 8. However these variables may

be indices of a relatively complicated teaching strategy being conducted by the teacher while attempting to achieve a variety of aims (R-2).

AP-12 and Ap-14, responsive instructional techniques, are positive predictors of inattention probably because the teacher uses them when pupil inattention occurs. Since we do not have the sequence of events revealed in the data, this speculation is based on the common sense assumption that in order to control attention the teacher is more likely to be responsive to students' questions and praise them for positive contributions and is more likely to ignore some forms of inattention as it occurs. A variety of materials (R-3), again, is a predictor which is positively related to inattention, and is therefore presumably having an undesirable effect. But, notice that AP-5 is related in the same way to inattention, AP-2. We suspect that these two variables are acting in conjunction. The more independent work (AP-5), the more inattention; and if a greater variety of materials is also being used in the independent seatwork, R-3 would be correlated positively with inattention, as it is. The variables that are negative predictors of AP-2, that is, variables that are associated with low inattentiveness are R-4, which is supervised seatwork, and AP-6 (teacher-group), and AP-9, (monitoring pupil progress), both of which are variables that we have discussed before in this type of relation.

AP-6, AP-7 and AP-8 are the principal predictors of attentiveness. AP-6 is a grouping variable that we have already seen is negatively related to inattentiveness and here is related positively to attentiveness. AP-7, teaching the class-as-a-whole, is also a context variable

that increases attention, and AP-8, organizing instruction, as we have pointed out before, appears here for the first time as a positive predictor of a positive pupil consequence. One suspects that contexts like those represented in AP-6 and AP-7, when combined with AP-12 (instructional responsiveness), constitute a pattern of effective instruction. When the combinations include AP-5 (independent work), R-3 (variety of materials) and R-2 (pupil practice time for skill learning), we have a teaching situation in which the student spends a large amount of time on the materials with relatively little instruction involved in the process.

Total Paths Between Teaching Performances and Learning Outcomes

The method of path analysis permits the construction of coefficients, which takes into account the various components of any path. Consider, for example, in the part of the structural model that we have been discussing, the path from the content AP-7, to student outcomes. This path has a component from AP-7 to AP-1, a component to AP-2, and a component to AP-3. AP-1, AP-2 and AP-3 in turn each have paths to an outcome measure. Therefore, if we wanted to know what the contribution of AP-7 was to an outcome measure, we would have to consider all of the paths from AP-7 to the outcome. Thus, a path from AP-7 to total reading is the sum of all of the paths from AP-7 to that outcome measure. Obviously, in computing the total path the positive and negative signs are taken into account.

Since we have already seen patterns of positive and negative correlations and patterns of positive and negative path coefficients, we should not expect to find large total path coefficients. We will, therefore, suspend temporarily our criterion rule and simply look at the relative magnitudes of the total path coefficients. Tables 9.17, 9.18, 9.19 and 9.20 present the total path coefficients for all of the performance variables and each of the outcome measures in both reading and mathematics at grade 2 and grade 5. The reader should be alerted that when reading the path coefficients for AP-1, AP-2 and AP-3 she or he will see numbers that have appeared in tables before. Since the step from AP-1, AP-2 and AP-3 to the outcome measure is a single path, the total path coefficient is the same as the single path coefficient we have discussed before. For the other variables such as WD-1 or R-2 or AP-6 the total path is the combination of all the sub-paths.

Grade 2 - Reading

In Table 9.17 the total paths for second grade reading are shown. Observe first the WD variables. WD-1, teaching time, appears negative as it has, regularly, in these analyses. We have generally interpreted the negative sign to mean that the amount of time being spent is being spent largely in non-productive ways. Notice also that the largest total path in this group is for WD-3, the conceptual complexity of the instructional design. WD-5 appears as a negative path coefficient, a sign we have seen attached to WD-5 before, and which we have interpreted to mean that variety of materials in and of itself did not contribute to pupil learning. Of the four RAMOS variables, R-3,

Table 9.17

Total Path Coefficients for Teacher Performance Variables and Outcome Measures: Grade 2 Reading (N = 40)

TOTAL PATHS

	CAT RCMP	READ APP	DECODING	READ ACH	TOT READ
WD-----1	-0.0101	0.0393	-0.0444	-0.0508	-0.0078
WD-----2	0.0774	0.0124	-0.0111	-0.0523	0.0396
WD-----3	0.0401	0.0070	0.0955	0.0183	0.0710
WD-----4	-0.0756	0.0410	0.0551	0.0230	0.0079
WD-----5	-0.0305	-0.0714	-0.0242	0.0674	-0.0625
RAMOS--1	0.0538	-0.0077	-0.0830	-0.0559	-0.0178
RAMOS--2	-0.0778	0.0278	0.0553	0.0364	0.0018
RAMOS--3	-0.0028	-0.0486	-0.0945	0.0021	-0.0721
RAMOS--4	0.0033	0.0055	0.0332	0.0088	0.0208
APPLE--1	-0.0844	0.1536	0.2777	0.0273	0.1706
APPLE--2	-0.2022	0.0221	0.0361	0.0909	-0.0752
APPLE--3	-0.1091	0.1231	-0.0126	-0.0655	-0.0007
APPLE--5	-0.0570	0.0269	-0.0064	-0.0005	-0.0187
APPLE--6	-0.0610	0.1058	0.1347	-0.0056	0.0860
APPLE--7	0.0747	0.0752	0.0793	-0.0666	0.1140
APPLE--8	-0.0100	-0.0067	-0.0278	-0.0019	-0.0221
APPLE--9	-0.0296	0.0745	0.0113	-0.0480	0.0273
APPLE-10	0.0533	0.0201	0.0215	-0.0332	0.0474
APPLE-11	-0.0333	-0.0046	0.0305	0.0335	-0.0039
APPLE-12	-0.0138	0.0752	0.0442	-0.0411	0.0519
APPLE-13	-0.1057	-0.0363	-0.0276	0.0695	-0.0849
APPLE-14	-0.0727	-0.0016	0.0359	0.0516	-0.0196

Table 9.18

Total Path Coefficients for Teacher Performance Variables and Outcome Measures: Grade 5 Reading (N = 53)

TOTAL PATHS

	CAT RCMP	READ APP	DECODING	READ ACH	TOT READ
WD-----1	-0.0115	0.0357	0.0003	0.0141	0.0168
WD-----2	0.0047	-0.1079	-0.0051	-0.0295	-0.0341
WD-----3	-0.0399	0.0041	0.0168	-0.0003	-0.0085
WD-----4	0.0271	0.0335	-0.0179	0.0129	0.0340
WD-----5	0.0164	-0.0168	-0.0056	-0.0069	-0.0020
RAMOS--1	-0.0054	-0.0565	0.0174	-0.0136	-0.0682
RAMOS--2	-0.0387	-0.0234	0.0241	-0.0090	-0.0428
RAMOS--3	0.0561	0.0342	-0.0357	0.0080	0.0660
RAMOS--4	-0.0174	0.0278	0.0031	0.0094	0.0149
APPLE--1	0.0414	-0.0439	0.0044	0.0058	-0.0908
APPLE--2	-0.0348	-0.3677	0.0965	-0.1099	-0.3677
APPLE--3	0.1824	-0.3012	-0.0137	-0.0807	-0.2397
APPLE--5	-0.0249	-0.1567	0.0450	-0.0480	-0.1571
APPLE--6	0.0663	-0.1362	0.0091	-0.0265	-0.1513
APPLE--7	0.0186	-0.1156	0.0200	-0.0298	-0.1193
APPLE--8	-0.0118	-0.0326	0.0120	-0.0107	-0.0333
APPLE--9	0.0255	-0.0346	-0.0031	-0.0084	-0.0264
APPLE-10	0.0155	-0.0113	-0.0048	-0.0032	-0.0043
APPLE-11	-0.0101	-0.0488	0.0153	-0.0148	-0.0508
APPLE-12	0.0480	0.0649	-0.0342	0.0229	0.0712
APPLE-13	-0.0234	-0.0237	0.0180	-0.0048	-0.0413
APPLE-14	0.0359	-0.1188	0.0100	-0.0340	-0.1029

Table 9.19

Total Path Coefficients for Teacher Performance Variables and Outcome Measures: Grade 2 Mathematics (N = 41)

TOTAL PATHS

	CAT MCMP*	CAT MCON**	MATH APL	MATH TOT
WD-----1	-0.0451	0.0518	0.0665	0.0574
WD-----2	-0.0285	0.0239	0.0948	0.0537
WD-----3	-0.0321	0.0263	-0.0005	0.0107
WD-----4	0.0261	-0.0305	-0.1026	-0.0631
WD-----5	0.0216	-0.0280	-0.0417	-0.0345
RAMOS--1	-0.1233	0.1231	0.0126	0.0649
RAMOS--2	-0.0216	0.0869	0.0782	0.0966
RAMOS--3	0.1070	-0.1513	0.0003	-0.0855
RAMOS--4	0.1310	-0.1198	-0.0563	-0.0802
APPLE--1	0.0997	0.0563	0.2081	0.1679
APPLE--2	-0.0520	0.0207	0.1836	0.0852
APPLE--3	0.2141	-0.2229	0.0654	-0.0797
APPLE--5	-0.0020	-0.0207	0.0842	0.0221
APPLE--6	0.1442	-0.1082	-0.0029	-0.0429
APPLE--7	0.0764	-0.0174	0.1005	0.0549
APPLE--8	0.0182	-0.0265	0.0192	-0.0063
APPLE--9	0.1191	-0.1440	-0.1394	-0.1406
APPLE-10	-0.0092	-0.0194	0.0179	-0.0094
APPLE-11	0.0569	-0.0900	-0.0451	-0.0736
APPLE-12	-0.0057	0.0454	0.0529	0.0576
APPLE-13	-0.0978	0.1298	0.0792	0.1081
APPLE-14	-0.0022	0.0096	0.0631	0.0357

* Concepts

** Computation

Table 9.20

Total Path Coefficients for Teacher Performance Variables and Outcome Measures: Grade 5 Mathematics (N = 54)

TOTAL PATHS

	CAT MCMP*	CAT MCOM**	MATH APL	MATH TOT
WD-----1	-0.0021	0.0733	0.0530	0.0612
WD-----2	-0.1362	-0.0025	-0.0356	-0.0619
WD-----3	0.0424	-0.0452	-0.0341	-0.0284
WD-----4	0.1280	0.0543	0.1109	0.1319
WD-----5	-0.0731	-0.0035	-0.0582	-0.0633
RAMOS--1	-0.1226	-0.0517	-0.0678	-0.0974
RAMOS--2	0.1054	0.0549	-0.0136	0.0327
RAMOS--3	-0.1825	-0.2199	-0.1193	-0.2014
RAMOS--4	0.1658	0.1613	0.1961	0.2375
APPLE--1	-0.2722	-0.1224	-0.0587	-0.1494
APPLE--2	-0.2341	-0.4032	-0.3905	-0.4909
APPLE--3	0.0544	-0.2953	0.1000	0.0009
APPLE--5	-0.0764	-0.1702	-0.1977	-0.2185
APPLE--6	0.0885	0.0214	0.1640	0.1521
APPLE--7	0.0609	-0.0518	0.0835	0.0627
APPLE--8	0.0247	-0.0644	0.0364	0.0520
APPLE--9	0.0519	0.1251	0.1400	0.1557
APPLE-10	-0.0064	-0.0140	0.0042	-0.0027
APPLE-11	0.0321	-0.0156	0.0671	0.0539
APPLE-12	-0.1797	-0.1706	-0.1832	-0.2340
APPLE-13	-0.0101	0.0013	-0.0234	-0.0197
APPLE-14	-0.0759	-0.1329	-0.1074	-0.1396

* CONCEPTS

**COMPUTATION

variety of materials, again has a negative path and is the largest of the total paths in that group. R-1, an instructional time variable, is negative, which we have found before and for which we offered an explanation similar to that which we offered for WD-1. If one looks over these eight variables, two of them, WD-5 and R-3, are indices of a variety of materials used by the teacher. In both cases these variables have negative total path coefficients. WD-1 and R-1 are also similar indices of teaching time and both have negative but very small path coefficients. The positive predictors, irrespective of size, are WD-2 which is a measure of the range of content covered; WD-3, the complexity of the design; R-2, the time spent practicing skills; and R-4, supervised seatwork. One would conclude from the relative weighting of these paths that the instructional variables are consistently likely to have positive paths whereas other features of instruction such as the variety of materials or the absolute time spent are negative predictors for grade 2 reading.

Now let us look at the three APPLE variables which are context variables. AP-5 (independent work) has a negative total path, AP-6 and AP-7 (group and whole-group instruction) both have positive total paths, with AP-7 having a somewhat larger total path coefficient.

Among the instructional teaching activities variables, AP-8, organizing, and AP-11, mobility, have negative signs (the magnitude of AP-11 is very small). The positive predictors are AP-9 and AP-10 which are interactive instructional procedures. Considering now the

responsive instructional procedures, AP-12, AP-13 and AP-14, we see that two are negative, and that the magnitude of AP-13 (social control) in this set is relatively large; but the positive predictor is AP-12, instructional responsiveness.

By looking at the relative weights of the total paths we have a fairly good idea of the positive contributors to achievement and those that are negative contributors. We suggest that the reader consider only the relative weights and not the absolute magnitudes, though we note that the magnitudes are generally in line with the significance of the relationships of these variables to outcomes in previous analyses. As a summary statement of the pattern of relationships here, we suggest that the picture appears to be one in which any variable that is an instructional variable, that is, comprises a set of actions or performances in which direct instruction takes place, generally has a positive path coefficient. Two context variables seem regularly to have positive paths as well as positive R's with outcomes, AP-6 and AP-7. The social control variables, AP-13 and AP-14 in the context of this total analysis appear as negative predictors of outcomes. We have seen that AP-13 (social control) has shown up as a positive predictor when it appeared among a set of positive predictors including variables such as AP-6 or AP-7. We suggest that since its general influence is revealed in this analysis as a negative, it is probably an index of classes in which attention is relatively lower; and it probably is an action used by many teachers. But when the teacher is already using effective instructional procedures and also uses AP-13, it may be that AP-13's seeming positive effect is a function of its relationship with these other predictors.

Grade 5 - Reading

Table 9.18 presents the same type of data as that presented in Table 9.17. Consider first the WD variables. In this analysis WD-1 is positive as is WD-4, but WD-2, WD-3 and WD-5 are negative. Three of the five Work Diary variables here have different signs than in the grade 2 analysis. Now, time spent (WD-1), is a positive predictor but amount of instructional content covered (WD-2), and complexity of the design (WD-3), are negative predictors, of which WD-2 has a larger magnitude, in fact the largest in this set of variables. WD-5 (variety of materials) remains as a negative predictor. WD-4 (variety of instructional contexts), is a positive predictor.

Among the RAMOS variables, R-1, time spent in instruction, is a negative predictor and has a larger path coefficient at grade 5 than it did at grade 2. Pupil time spent practicing skills, (R-2), is now a negative predictor. R-3, variety of materials, is now a positive predictor and R-4, supervised seatwork, is positive at both grade levels. In this set R-3, variety of materials, and R-4 variety of instructional activities (pupil seatwork) are positive predictors.

Moving down to the context variables AP-5, AP-6 and AP-7, we see that they have the largest total path coefficients in this set; and, at this grade level, all three are negative predictors. Instructional teaching activities (AP-8, AP-9 and AP-10) are also negative predictors,

as is AP-11. Only AP-12, responsiveness to pupils, is a positive predictor in the whole set of APPLE variables which describe teacher actions.

If one were to consider only the variables with the largest total path coefficients, they would all be negative predictors, AP-14 (nonresponsive), AP-7 (teacher-class), AP-6 (teacher-group) and AP-5 (independent work). The largest positive predictor is AP-12 (responsiveness) and the next largest is R-3 (variety of materials).

Grade 2 - Mathematics

Table 9.19 presents the total path coefficients for grade 2 mathematics. Among the Work Diary variables WD-1, time spent, WD-2, breadth of material covered, and WD-3, quality of teaching design are all positive predictors. The largest negative predictor in this set is WD-4, variety of contexts. Again we see that WD-5, variety of instructional materials, is a negative predictor. At this grade level the three instructional variables, including time spent, have positive path coefficients to pupil learning.

Among the RAMOS variables, two are positive and two are negative. R-1 is a measure of the amount of time the teacher spends instructing. This is a variable similar to WD-1 which also had a positive total path. R-2 pupil practice time, has the largest positive total path in this group. R-3, which is variety of instructional materials, is a variable like WD-5 and it is also a negative predictor. R-4, variety of instructional activities (pupil seatwork) is a negative predictor.

Among the context variables, AP-5 appears positive for the first time, as does AP-7. But AP-6, teacher-group, is a negative predictor. Among the instructional activity variables (AP-8, AP-9 and AP-10), all are negative predictors, as is AP-11. The largest is AP-9, which is unsustained interactive instruction. Among the responsiveness variables AP-12, AP-13, AP-14 all are positive predictors, and the largest is AP-13, social control.

Several speculations suggest themselves. One is that there is a context-instructional technique interaction in these data across grade levels and subject matter. The context variables have shifted in sign as we have moved through these analyses indicating that they are more or less effective (depending upon the sign). The instructional technique variables have also shifted in sign. In this case, for grade 2 mathematics, the whole class instruction variable has a positive path coefficient but the instructional techniques have negative total path coefficients. AP-9, for example, is an instructional technique in which the teacher asks questions, answers questions and checks on pupil work. If the teacher is also using teacher-led group activities, this combination of context and instructional technique would probably not be effective. The reader should remember that while the data here do not permit us literally to combine because the variables are not paired, we do know that certain types of contexts are associated with certain types of instructional techniques. What we are seeing in this table is the overall effectiveness of either a contextual arrangement or an instructional technique arrangement, as it appears in relationship to other arrangements and techniques that the teacher has used.

Grade 5 - Mathematics

Table 9.20 presents the total path coefficients for grade 5 mathematics. Considering the Work Diary variables we find that WD-4, variety of contexts and WD-1 time spent teaching, are both positive predictors. WD-5, variety of materials, appears as a negative predictor. This is the fourth time that this variable has had a total path coefficient which is negative, which should lead to some suspicion of the notion that the use of a variety of materials contributes to the effectiveness of teaching. WD-2 and WD-3 are both negative predictors. WD-2 being the breadth of content covered and WD-3 being the complexity of the instructional design. We have offered the conjecture before that these two variables are a measure of the complexity of the instruction being offered to the student, and it may be that they act as negative predictors because the teachers are having difficulty managing that complex instruction.

This last conjecture is supported if we look down at the total path coefficient column for AP-5, independent work, where the path coefficient is large, near our criterion level for consideration in previous discussion and where the sign is negative. In contrast, AP-6 , teacher-group, is a positive predictor as is AP-7, teacher-class.

Among the RAMOS variables R-3, a variety of instructional materials, as is WD-5, is also a negative predictor. R-4, variety of instructional activities with emphasis on individual seatwork, is a positive predictor. One should recall that R-4 is a contrasting

performance to that of AP-5, independent seatwork. Independent seatwork (AP-5) involves minimal supervision on the part of the teacher, whereas R-4 measures the amount of individual instruction in which the teacher is working with the student and also includes weightings from other instructional techniques the teacher is using. R-4 is an instructional variable, AP-5 a context variable, and it seems obvious that simply permitting children to work independently is usually an ineffective teaching procedure, whereas having children work independently and interacting instructionally with them at the same time is an effective procedure.

AP-9 has a relatively large total path coefficient and is a positive predictor. This variable measures the amount of interaction of the teacher with the student where the questioning and answering is ad hoc rather than sustained as in a question and answering period as is the type of performance that is measured by AP-10. One suspects that AP-9 scores may form a pattern with R-4 scores so that a combination of these two instructional variables may represent an effective way of teaching fifth grade mathematics.

AP-12 has a surprisingly large and negative total path coefficient, as does AP-14. All three responsiveness variables are negative predictors. One suspects that a performance like AP-12, responsiveness to pupils, is being used as a social control device, but even allowing for that possibility, its negative path is still surprising.

Summary of Total Paths Between Teaching Performances and Learning

We have seen in the total path analysis that the signs and magnitudes of the predictor variables are not consistent with the dependent variables across either subject matter or grade level. It seems to us that this is an important observation, one that we have noted in the multiple regression analyses in Chapter 7. We think, also, that we perceive in these varying patterns of relationships a context by instructional technique interaction. We also have observed that the use of a variety of instructional material usually has a negative coefficient.

These data are the last analyses of the relationship of teaching performances to student learning that will be presented in this volume. It should be obvious that patterns are systematically appearing and that significant relationships have been found. We turn now to considering the independent variables with respect to teaching performance. In the remaining section of this chapter we will be asking the question, what factors associated with teachers aptitude, knowledge, or attitudes influence teaching performances? We will also be asking the question, what aspects of the environment of teaching seem to influence teaching performances?

The Relation of Teacher Knowledge, Teacher Aptitude, Teacher Attitudes and Organizational Structure to Teaching Performance

The reader should refer to Figure 6.1 and locate Cells 3, 6, 7a, 7b and 8. You will recall that there were a number of variables in each of these domains. We will now present the path coefficients

for those variables. In Figure 6.1 notice that there is an arrow from each of these variables to Teaching Performance. The prediction here is that these variables have a direct effect upon teaching performances. In the tables that present the path coefficients, we have selected those path coefficients which are .25 and above in magnitude. Where blank spaces occur in the tables, the reader should remember that there were path coefficients for these paths but that they were less than .25.

Grade 2 - Reading

Table 9.21 presents the path coefficients above .25 for the various domains of variables and each teaching performance. The reader may read this table in several different ways to get a feeling for the data. If, for example, we wish to know whether a teaching performance such as WD-1 has been influenced or is predicted by variables in each of these domains, we simply read down from WD-1. Notice that three variables in the organizational structure domain related to WD-1; instructional complexity, degree of teaming and centralization of decision-making. Notice that one variable in the domain of teachers' attitudes relates to WD-1 (teaching time). By reading down columns this way we can determine which exogenous or independent variables are related to each performance variable.

Table 9.21

Path Coefficients .25 and Above for Paths from Each Domain of Variables Influencing Teaching Performance and Those Teaching Performances
Grade 2 Reading (N = 40)

	WD-1	WD-2	WD-3	WD-4	WD-5	R-1	R-2	R-3	R-4	AP-5	AP-6	AP-7	AP-8	AP-9	AP-10	AP-11	AP-12	AP-13	AP-14
Cell 3: Organizational Structure																			
1. Instructional Complexity	+.34	------	----	+.27	+.32	----	-.34	-.54	-.67	----	-.43	----	----	----	----	+.50	----	----	----
2. Degree of Teaching	-.32	------	----	----	----	----	----	----	-----	----	+.28	----	----	----	----	-.25	----	----	----
3. Student Consensus	----	-.48	----	----	----	----	(-.24)	----	-----	----	----	----	----	+.26	----	----	----	----	----
Teacher Perceptions of:																			
4a. Centralization of Decision Making	+.37	-----	-.51	(+.24)	----	----	----	-.45	-.46	----	-.52	----	----	----	+.27	+.43	----	----	----
4b. Principal Help	----	-.27	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Cell 6: Teacher's Attitudes																			
1. Aspirations	----	-----	-.45	+.60	----	----	----	----	----	-.45	----	+.49	----	----	----	+.31	----	+.33	----
2. Satisfaction	----	-.58	+.46	----	----	-.31	----	----	----	-.28	+.36	----	----	----	----	----	+.38	----	----
3. Perception of Student Characteristics	-.38	----	+.31	----	+.53	----	----	-.29	----	----	----	-.40	----	----	----	-.78	----	----	----
Cell 7a: Teacher Knowledge																			
1. Knowledge of Teaching Methodology	+.36	----	-.29	----	-.36	----	----	----	----	----	-.26	----	----	-.29	----	+.44	----	----	----
Cell 7b: 2. Knowledge of Subject Matter	-.27	----	-.53	----	----	----	----	----	----	----	+.30	-.42	+.39	-.45	----	----	----	----	----
Cell 8: Teacher's Aptitude																			
1. Verbal Fluency	----	+.27	+.33	-.55	----	----	----	+.30	----	+.36	+.48	----	-.25	----	----	-.28	+.49	+.25	-.37
2. Memory	----	(-.24)	+.57	-.28	----	----	----	+.53	+.39	+.27	----	----	(+.24)	----	----	-.37	+.33	----	+.32
3. Reasoning	----	(-.24)	----	----	-.77	----	+.27	----	----	----	-.29	----	----	+.66	----	+.26	----	----	----
4. Flexibility	+.25	+.38	-.43	+.52	+.77	----	----	-.46	----	-.92	-.49	+.34	-.48	----	----	+.34	-.25	+.30	----
5. Cognitive Style	----	-.44	----	----	-.37	-.41	-.37	-.54	-.28	----	----	----	+.25	-.60	-.46	----	-.42	-.32	----

Another way to read the tables is to pick either a domain or a variable within a domain and read across the variables columns and see the extent to which that variable has a signicant influence on performance. Following this procedure, notice that teacher aptitude variables appear more frequently than do other domains of variables. We would conclude that among the domains of variables represented here teacher aptitude variables are the ones most substantially related to teaching performances.

Some of the relationships found here are simply reflections of interdependencies among events. Instructional complexity, for example, has positive path coefficients for WD-1 (time spent), WD-4 (organizational complexity), and WD-5 (variety of instructional materials), which one would expect when we recall that instructional complexity tells us the amount of individualization, the number of aides that the teacher has available and the variety of materials used for instruction. Since the information for the variable instructional complexity comes from a teacher questionnaire and the Work Diary scores come from a teacher self-report, we are essentially getting the same kinds of information.

Of greater interest in these tables for the purpose of understanding relationships are the relations between these independent variables and the teaching performances which were directly observed. We will therefore concentrate our discussion on those variables drawn from the RAMOS and APPLE observations. We notice that instructional complexity has its largest positive path with AP-11,

which is a mobility factor. This path coefficient simply means that as the instructional situation becomes more complex the teacher moves around more. The other correlations are negative. There is a negative correlation between AP-6 and instructional complexity. AP-6 means the teacher is directing group activities. Thus we have two pieces of information that suggest that the more they say they individualize the less they are observed teaching in a group. The relations are surprising with R-2, skill practice time, R-3, the variety of instructional materials, and R-4 the time pupils spend in seatwork. The most sensible conclusion from these path coefficients is that the teachers who report data that suggest they have greater instructional complexity, or individualization, are not the teachers who are observed using a greater variety of materials, or who use more seatwork, or have a greater amount of skill practice.

Degree of teaming, another aspect of organizational structure, has a positive correlation with AP-6 so that we may infer that teaming facilitates the use of groups. As we have seen before, AP-6 is a teaching context which is fairly effective. The centralization of decision-making variable, another aspect of organizational structure, has negative relations with observed performance variables R-3, variety of instructional materials, R-4 variety of instructional techniques weighted by individual seatwork, and the AP-6 context of grouping. Note also that centralization of decision-making has a negative correlation with WD-3, the complexity of the instructional design and a positive correlation with WD-1, amount of time spent teaching reading. One begins to suspect that the differences in the

structure of decision-making are related directly to differences in styles of teaching that were observed in the school.

The teacher's attitudes cell has three components, one related to aspirations which is a measure of the teacher's commitment to assume greater responsibility within the teaching profession by teaching other teachers or supervising other teachers or being a master teacher. It might be regarded as a combination of factors related to the teacher's desire to be an excellent teacher and to improve the quality of teaching in the teaching profession. This variable has a negative relationship with AP-5, the amount of independent seatwork, and a positive relationship with teaching the class as a whole. Thus one suspects that teachers who desire to be a better teacher tend to use the class mode of instruction more than any other contextual arrangement. Note also in that same domain of teaching that teacher satisfaction is negatively correlated with independent pupil seatwork, which is not surprising since we did find a relationship between that type of contextual arrangement and pupil inattentiveness. On the other hand, satisfaction is positively related to grouping. Teacher satisfaction may be a function of the type of contextual arrangement that the teacher consistently uses in teaching reading. One could also speculate that since AP-6 is a variable that is related to more effective learning, the teachers may obtain more personal rewards in terms of seeing their students improve when they teach students in groups.

Notice the mixture of signs for the path coefficients between the knowledge of teaching methodology and knowledge of subject matter

and the performance variables. Knowledge of subject matter is positively related to AP-6, grouping, and AP-8, organizing, and the knowledge of teaching methodology is related to AP-11, a mobility factor. Knowledge of the subject is negatively related to teaching the class as a whole, AP-2, and to AP-9, the spot-check question and answering type technique. It is not an unreasonable speculation that these performances may reflect the ability of the teacher to control how much information he or she has to have available. A teacher-group situation provides for more interactions between the teachers and students, but the teacher-class context or the teacher moving around the room asking questions may be performances which enable the teacher to control the amount of information input from the students or the amount of information that he or she must give to the students.

Turning now to the aptitude factors, we notice that verbal fluency generally has a few more positive relations than negative with teaching performances. It has a negative relation with AP-8 and AP-11, and a substantial positive relation with AP-6 and AP-12. We see here a pattern in which the two performances, AP-8 and AP-11, are performances which do not put a demand on the teacher for a high level of verbal processing of information. A teacher who is acting so that his or her behavior is classified as AP-8 is a teacher who is organizing the pupil for work, and AP-11 characterizes the teacher who is moving around doing some interacting with the students. On the other hand we note that the positive correlations with verbal fluency are correlations where the teacher does interact with the students. Thus a combination of AP-6 and AP-12 performances is a teacher who is

interacting with students and such performances obviously require verbal fluency skills.

The largest path coefficients between memory and performance factors are those related to the use of a variety of materials (R-3) and to the complexity of the teacher's conceptualization of the instructional design which seem to be rather obvious relations. We would expect that using a variety of materials and a complex teaching methodology places a demand on the teacher to remember many different things. There is a negative relationship between memory and AP-11 which, again, is the mobility factor. Here we think we see a hint of a combination of aptitudes which are more likely to be associated with the teacher who is more mobile, but not necessarily more interactive. As we have seen before the relations between verbal fluency and memory and AP-11 are both negative.

Reasoning has a substantial positive relation with AP-9 which is a monitoring technique, and also with AP-11 but a negative relation with AP-6 (teacher-group) and WD-5 (variety of materials). Perhaps here we see a pattern of information processing in which the teacher uses short term questioning and answering techniques in order to help a student think through a problem; whereas when a teacher is working in a group he or she is more likely to be explaining, discussing and elaborating but not necessarily in a logical, deductive manner. This may be particularly true in a subject such as reading.

The flexibility measure produces an interesting and substantial number of path coefficients. Note that the path coefficient for the path to AP-5 is -.92. It should be apparent that teachers who use

AP-5, which is generally associated with less effective learning, are teachers who have a distinctive style. We suspect that organizing instruction in unsupervised independent seatwork is, in fact, a way of coping with the complexity of teaching by avoiding it, and one would not be surprised, therefore, to find that people who are high in flexibility would be low in the use of this particular technique, or that people who have high scores on the use of this technique would be low on verbal flexibility. High flexibility is also associated with the use of a variety of materials.

In this array, cognitive style generally produces negative path coefficients. The high score end of the cognitive style measure is associated with field-independence, the tendency to process information more analytically and to be more structured. The only positive correlation is with AP-8, the organizing variable, and its strongest negative relation is with AP-9 which is a questioning technique which in many ways is essentially an unorganized questioning technique. It is also, strange to say, negatively correlated with AP-10 and AP-12 both of which are also questioning and instructional strategies. It may be that what we are seeing here is a picture of the questioning strategies used by teachers which are essentially not analytic. Questioning may be used simply to determine what a student knows, and thus essentially an evaluative device, or questioning may be relatively unorganized from an analytic point of view.

In considering this array of relations it is obvious that there is probably an aptitude by teaching performance interaction. The large number of relations obtained between the aptitude factors and

the performance factors strongly suggest this factor. What seems to be emerging as one looks at these data is a picture in which the performance in many ways represents stylistic variables related to the teachers' aptitudes. The absence of larger path coefficients with the knowledge of teaching methodology and knowledge of subject matter suggests that this domain is less critical in the kinds of performances that emerge. The conclusion should not be that teachers do not need to know the subject matter nor that they do not need to know methodology. What seems more likely is that teachers are using certain teaching styles which have indirect connections with what they know about the teaching of the subject.

Grade 5 - Reading

Table 9.22 presents the same kind of information for grade 5 reading. Notice that the organizational variables have relatively fewer relations to teaching performance. Centralization of decision-making has positive relations with two types of contextual arrangements, AP-6 and AP-7, and a very strong positive path coefficient with AP-10, the use of extended interaction instructional techniques. One suspects that we see here a pattern of emphasis on instructing that is associated with who makes the decisions about the school program. We also note the negative path coefficient with AP-11, teacher mobility. What appears to be in these data is a teaching style that is associated with the centralization of decision-making in the school. In other words one sees here an effect of the principal's administrative style on the character of teaching performance in the school.

Table 9.22

Path Coefficients .25 and Above for Paths from Each Domain of Variables Influencing Teaching Performance and Those Teaching Performances
Grade 5 Reading (N = 53)

	WD-1	WD-2	WD-3	WD-4	WD-5	R-1	R-2	R-3	R-4	AP-5	AP-6	AP-7	AP-8	AP-9	AP-10	AP-11	AP-12	AP-13	AP-14
Cell 3: Organizational Structure																			
1. Instructional Complexity	+.48	+.32	----	+.26	+.28	----	-.32	----	----	----	----	----	----	----	----	----	----	----	-.42
2. Degree of Teaching	----	+.28	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-.28	----
3. Student Consensus	----	----	----	-.28	----	----	----	(+.24)	----	-.40	----	+.27	(-.24)	----	----	-.28	----	----	----
Teacher Perceptions of:																			
4a. Centralization of Decision Making	----	----	+.33	----	+.25	----	(-.24)	----	----	----	+.40	+.43	----	----	+.54	-.47	----	----	----
4b. Principal Help	----	+.30	----	----	----	----	----	+.27	----	-.34	----	----	----	----	----	----	----	----	----
Cell 6: Teacher's Attitudes																			
1. Aspirations	----	+.32	----	+.48	----	----	----	----	----	-.36	----	----	----	+.40	+.36	-.48	----	(-.24)	----
2. Satisfaction	-.35	----	-.29	-.32	----	----	+.40	+.38	----	----	-.46	----	----	----	-.27	+.59	+.29	----	+.28
3. Perception of Student Characteristics	----	----	----	----	----	----	-.37	-.44	----	----	-.39	----	-.36	----	----	----	----	+.32	----
Cell 7a: Teacher Knowledge																			
1. Knowledge of Teaching Methodology	+.38	----	----	+.34	----	----	----	----	----	----	+.31	----	+.28	----	+.44	-.35	+.30	-.31	----
Cell 7b: 2. Knowledge of Subject Matter	----	----	+.25	----	+.72	----	----	----	----	-.38	+.33	----	-.27	(-.24)	----	+.37	----	----	-.30
Cell 8: Teacher's Aptitude																			
1. Verbal Fluency	----	+.47	+.71	----	-.73	-.25	-.44	----	----	+.41	-.29	+.25	+.63	+.31	----	-.43	----	----	----
2. Memory	-.33	-.26	----	-.34	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
3. Reasoning	-.29	-.30	-.40	-.54	----	----	----	----	----	+.30	----	----	-.23	-.39	----	+.28	----	+.49	----
4. Flexibility	----	----	-.58	+.31	----	----	----	----	----	----	----	-.37	-.50	----	-.29	----	-.52	----	----
5. Cognitive Style	-.33	+.26	(+.24)	----	----	----	+.45	----	----	-.37	----	+.31	(-.24)	+.25	+.45	----	+.51	-.25	----

In the teachers' attitude domain note the path coefficients of aspirations and satisfaction with AP-9 through AP-12. Aspirations has positive path coefficients with AP-9 and AP-10, interactive instructing, and a negative path with AP-11, teacher mobility. Satisfaction has positive path coefficients with AP-11, teacher mobility, and AP-12, responsiveness, but a negative path with AP-10, an interactive instruction category. Teacher aspirations appear to relate to interactive instruction while teacher satisfaction relates to more mobility and more responsiveness to individual students. We suspect that mobility is a marker of a teacher who is doing relatively less instructing.

The teacher aptitude domain produces the largest number of relations. Generally the verbal fluency factor and the flexibility factor produce substantial relations with the observed performances. Cognitive style has generally positive relations with the instructional teaching activities and with the context variable, teaching the class as a whole, and it has a negative relation with pupil independent work. These relations are interesting because in the process of analyzing the teacher aptitude data a number of factor analyses were performed. In this process we kept obtaining somewhat different structures for the teachers at the two different grade levels until we performed an analysis in which we used a targeted structure technique. We notice in grade 2 reading that the teacher's cognitive style (field independence being the high end) is generally negatively related to the performance variables, whereas in grade 5 cognitive style is positively related. Thus we may have a different set of aptitudes

associated with the grade level at which the teachers teach and these differences in aptitudes may be reflected in the differences in teaching performances to which the aptitudes are related.

Grade 2 - Mathematics

Table 9.23 presents similar information for grade 2 mathematics. Again we will concentrate attention mainly on the observed teaching performances. We note that instructional complexity in grade 2 mathematics has a positive relation with independent work which suggests that as more aides are available or more grouping is used, some students are permitted to work independently. This speculation is corroborated by the fact that AP-7, simultaneous instruction of the whole class, has a negative path coefficient from instructional complexity. Also AP-8, AP-9, and AP-10, all instructional variables related to teaching activity, have negative relations with instructional complexity. One could conclude that as the instructional organization becomes more complex there is a decline in the number of observed instances of the use of instructional teaching activities. This speculation is supported by the positive path coefficient between the amount of teaming and AP-9. When teachers team, they usually teach groups, one might then expect to see more use of sustained questioning techniques, and consequently to find a positive path coefficient. In this case, again note that the centralization of decision-making seems to be related to the type of contextual arrangements that are used in teaching. The relationship is negative in the case of AP-5, independent pupil work, and AP-6, teacher group, and positive in the case of AP-7, whole class instruction. One can conclude from the data that in general, greater centralization

Table 9.23

Path Coefficients .25 and Above for Paths from Each Domain of Variables Influencing Teaching Performance and Those Teaching Performances
Grade 2 Mathematics (N = 41)

	WD-1	WD-2	WD-3	WD-4	WD-5	R-1	R-2	R-3	R-4	Ap-5	Ap-6	Ap-7	Ap-8	Ap-9	Ap-10	Ap-11	Ap-12	Ap-13	Ap-14
Cell 3: Organizational Structure																			
1. Instructional Complexity	+.63	+.44	----	----	----	----	----	----	----	(+.24)	----	-.44	-.34	-.26	-.73	+.40	----	-.45	-.52
2. Degree of Teaching	----	-.34	----	-.66	+.25	----	----	----	----	----	----	----	----	+.39	----	-.33	----	----	----
3. Student Consensus	+.30	----	-.50	----	-.36	----	----	----	----	----	----	----	----	----	-.37	+.52	----	----	----
Teacher Perceptions of:																			
4a. Centralization of Decision Making	+.37	+.44	----	+.74	+.29	----	----	----	----	-.27	-.66	+.28	-.67	----	----	+.30	----	-.39	----
4b. Principal Help	----	----	----	----	+.32	+.25	----	----	----	----	----	+.41	----	+.35	----	-.27	----	----	+.26
Cell 6: Teacher's Attitudes																			
1. Aspirations	+.33	----	----	+.67	+.57	----	----	----	----	-.36	-.54	+.51	----	----	----	----	-.30	----	----
2. Satisfaction	----	-.30	----	-.93	----	----	----	----	+.28	----	+.46	----	----	----	----	----	----	----	-.45
3. Perception of Student Characteristics	-.28	----	+.67	-.27	----	----	----	----	----	+.44	----	----	+.28	----	----	----	+.31	----	+.35
Cell 7a: Teacher Knowledge																			
1. Knowledge of Teaching Methodology	----	----	----	----	-.30	----	----	----	----	----	+.79	-.61	----	(-.24)	----	----	+.29	+.27	----
Cell 7b: 2. Knowledge of Subject Matter	----	-.50	+.38	----	+.32	-.32	----	----	----	+.27	----	----	(-.24)	-.57	----	----	-.58	----	+.37
Cell 8: Teacher's Aptitude																			
1. Verbal Fluency	----	----	----	-.26	----	----	----	----	----	----	+.32	----	----	(+.24)	-.33	----	----	+.71	----
2. Memory	----	----	----	-.50	-.46	----	-.26	----	+.35	----	+.51	-.31	(+.24)	----	+.51	+.25	+.46	----	-.25
3. Reasoning	----	+.42	-.99	+.41	----	+.56	----	+.46	----	----	-.27	----	----	+.32	----	----	----	(-.24)	----
4. Flexibility	+.59	+.36	----	+.99	+.40	-.30	----	-.40	----	-.65	-.68	+.86	-.36	----	----	----	-.36	----	----
5. Cognitive Style	----	----	+.25	-.59	----	-.37	-.33	-.31	----	----	----	----	----	-.34	----	----	----	-.51	(-.24)

of decision-making is associated with the use of teaching the class as a whole, but not in groups, and with relatively less assignment of independent pupil seatwork.

In the domain of teachers' attitudes note the negative path coefficients between aspirations and AP-5 and AP-6, and the positive coefficients with AP-7. Note that this is the same pattern as the teacher's perceptions of the centralization of decision-making. Teachers may be using the organizational strategies that they think the principal wants. This relationship may be an instance of what many people believe is a type of preferred teaching style in which the teacher teaches the class-as-a-whole. It also reflects the common stereotype of teaching as a situation in which the teacher works with the class-as-a-whole. Knowledge of teaching methodology has a strong positive path to AP-6 (teacher-group), a strong negative path to whole class instruction, and positive paths to teacher responsiveness. Knowledge of subject matter has strong negative paths to interactive instruction and responsiveness.

In the domain of teacher aptitude factors, notice the relationship between the aptitude factors and AP-6, grouping. Teacher satisfaction with teaching, knowledge of teaching methodology and two teacher aptitude factors, verbal fluency and memory, are all associated with grouping children for instruction. There are two positive factors here, one associated with memory and the other with verbal fluency, and two negative paths, one associated with flexibility and the other with reasoning. Now notice the relations of the aptitude factors with AP-7 where there is a strong positive relationship between flexibility and

teaching the class-as-a-whole and a negative relation between memory and teaching the class-as-a-whole. Teacher perceptions of centralization of decision-making, the amount of principal help in the instructional process, their aspirations as a professional, and their level of flexibility are associated with teaching the class-as-a-whole. There seem to be two patterns, one associated with grouping pupils and the other with teaching the whole class simultaneously. The difference in the direction of the path coefficients for the verbal flexibility factor and contexts may indicate that people who are more flexible simply prefer to teach the class as-a-whole, or it may be associated with teachers who are flexible enough to teach as they think the principal wants it to be done. Teaching the class-as-a-whole may be more difficult because of the larger number of interactions that are involved, and because the teacher must process more information, it may require more flexibility. This speculation is supported by the negative relationship of verbal flexibility to AP-5 which is unsupervised independent pupil work. Such an arrangement places little demand on the teacher's skill in verbal processing since he or she can act serially and sequentially with each student, coping with the information flow a unit at a time as it were. What we are suggesting here again is what we have suggested before, that the aptitude factors may be related to preferred teaching styles in which the teacher can utilize a particular aptitude or which is "more comfortable" because of his or her particular aptitude structure. Cognitive style measures are generally negatively related to the performance variables which again suggests an aptitude by performance type of interaction. The

largest path of cognitive style to performance is that with AP-13, a social control performance variable. A similar relationship appeared at grade 5 reading and at grade 2 reading and will be shown subsequently in grade 5 mathematics. This relationship is so consistent that one runs little risk in concluding that field independent individuals use relatively fewer social control techniques. Note also the negative relation between cognitive style and AP-9, a type of unfocused questioning technique.

In the aptitude array the strongest positive correlations are between verbal flexibility and AP-7, whole-class instruction and WD-4, variety of instructional contexts which reflects the teacher doing most of the teaching him or herself; two of the strongest negative relations are those between verbal flexibility and grouping, and verbal flexibility and independent pupil work. The strongest negative correlation is that between the teacher aptitude reasoning and the complexity of the teacher's conceptualization of the instructional design. Among the instructional variables, the positive relations are found with the memory factor, presumably because in the teaching of mathematics a greater demand is placed upon remembering information. A very strong positive relation is found between verbal fluency and AP-13, which suggests a pattern that a person who is verbally fluent is more likely to use a social control technique involving redirection.

Grade 5 - Mathematics

Table 9.24 presents the path coefficients for grade 5 mathematics. What should be apparent simply by scanning the table is that, for grade 5 mathematics, there are relatively fewer substantial path coefficients

Table 9.24

Path Coefficients of .25 and Above for Paths from Each Domain of Variables Influencing Teaching Performance and Those Teaching Performances
Grade 5 Mathematics (N = 54)

	WD-1	WD-2	WD-3	WD-4	WD-5	R-1	R-2	R-3	R-4	Ap-5	Ap-6	Ap-7	Ap-8	Ap-9	Ap-10	Ap-11	Ap-12	Ap-13	Ap-14
Cell 3: Organizational Structure																			
1. Instructional Complexity	+.46	+.30	----	+.31	+.26	----	----	----	----	+.32	----	-.37	----	----	----	----	----	(-.24)	----
2. Degree of Teaching	----	----	----	----	----	----	----	----	----	-.26	-.40	----	----	----	----	----	----	-.46	----
3. Student Consensus	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Teacher Perceptions of:																			
4a. Centralization of Decision Making	----	-.32	----	----	----	----	----	----	----	----	----	+.36	----	----	+.33	----	----	----	----
4b. Principal Help	----	----	----	----	----	----	----	----	----	----	-.34	----	-.37	----	-.32	----	----	----	----
Cell 6: Teacher's Attitudes																			
1. Aspirations	+.27	----	----	----	----	----	-.27	----	----	-.25	----	+.32	----	----	----	-.37	----	----	----
2. Satisfaction	----	----	----	----	----	----	----	+.26	----	----	-.30	----	----	+.39	----	----	+.33	----	+.33
3. Perception of Student Characteristics	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-.30	----	+.43	----
Cell 7a: Teacher Knowledge																			
1. Knowledge of Teaching Methodology	----	----	+.52	----	----	-.27	----	----	----	----	----	----	(+.24)	+.43	-.33	----	----	----	----
Cell 7b: 2. Knowledge of Subject Matter	----	----	+.28	----	----	----	----	----	----	----	----	----	----	+.40	----	----	+.27	----	----
Cell 8: Teacher's Aptitude																			
1. Verbal Fluency	----	+.53	----	+.45	-.32	----	(+.24)	----	----	----	----	----	----	-.25	+.28	----	----	-.36	----
2. Memory	----	----	----	----	----	----	----	----	-.26	+.28	----	----	----	+.42	----	----	+.34	-.29	+.28
3. Reasoning	-.35	-.36	-.51	----	----	----	----	(-.24)	----	----	----	----	----	----	----	+.47	----	+.26	----
4. Flexibility	----	----	-.38	----	+.29	----	----	----	----	----	----	----	----	-.39	-.25	----	----	+.71	-.40
5. Cognitive Style	----	----	+.42	----	----	----	----	----	+.34	----	----	----	-.33	----	+.60	-.25	----	-.33	+.31

in this array than in the other arrays. Notice, for example, that the instructional complexity is related to only two context variables, AP-5 and AP-7. Having more aides available is positively related to the independent seatwork and is negatively related to teaching the class-as-a-whole. The observed performances generally correspond to what we would expect given the teacher's description of the nature of his or her instructional organization. But the negative relation between the degree of teaming and teacher-group context is somewhat surprising. Perhaps in teaching fifth grade mathematics, teachers divide the classes up into groups but do not teach in a group style but rather in the same style they would use if they were teaching the class as a whole. The amount of perceived principal help is related to three kinds of instructional variables, negatively to organizing for instruction (AP-8), positively to AP-9, short term instructional interaction, and negatively to the more focused instructional techniques such as discussing or explaining, AP-10. This is indeed a strange pattern, but the key may lie in the negative relationship between principal help and AP-6. One suspects that principals who are providing more help may be encouraging less grouping. But the variation in the signs of the path coefficients to the instructional variables, AP-8, AP-9, and AP-10 is indeed puzzling unless, when grouping is less characteristic, such variables as AP-10 occur less frequently in grade 5 mathematics. The teacher attitude category has relatively few path coefficients of substantial magnitude and in only one case are two of the three attitude measures related to a single performance variable. That is the case of the relations of the attitude variables to AP-11

(mobility) where negative relations are obtained between aspirations and AP-11, and between perception of students and AP-11. Here we may see a pattern in which the teacher who has higher aspirations as a teacher, simply uses another instructional technique. This conclusion is suggested by the positive correlation between aspirations and AP-7. We have seen this pattern before, so it is a reasonable conclusion that teachers with higher aspirations are teachers who in fact do more teaching of the class-as-a-whole and therefore are less inclined to be moving around the classroom because they are not using groups or individualized instruction.

Among the aptitude factors somewhat fewer relations are obtained in grade 5 mathematics than characterized the other arrays. Cognitive style is positively related to the complexity of the teacher's conceptualization of instructional design as it was for grade 2 mathematics; that performance is associated negatively with reasoning as it was for grade 2 mathematics and grade 5 reading. Cognitive style is also positively related to R-4 which is a variety of instructional techniques weighted with individual instruction and also to AP-10 which is sustained instructional techniques, such as explaining and discussing. Again, note that cognitive style is negatively related to social control, AP-13. Verbal flexibility has negative relations with AP-9 and AP-10. This is somewhat puzzling, particularly in the case of AP-10, since we assume that the teacher with higher verbal flexibility is more likely to be using a greater variety of instructional techniques. However, the same relation exists in grade 5 reading. Verbal flexibility also has a substantial positive path coefficient with AP-13, social control.

Summary of the Relation of Teacher Knowledge, Teacher Aptitude, Teacher Attitudes and Organizational Structure to Teaching Performance

We have led the reader through these tables pointing out interesting relationships and providing possible interpretations. A few generalizations seem relevant. The teacher aptitude factors are consistently related in one way or another to teaching performance measures. This suggests a performance-aptitude interaction. It further suggests the possibility that teachers develop styles related directly to their aptitudes.

We also have noted some relations between organizational structure and teaching performances. There are sufficient data here to suggest that the administrative style as reflected in the centralization of decision-making is related to the type of teaching context and to the instructional performances that are likely to be used in a school. Hinted at in the data seems to be a tendency to what might be called more "formal" instructional procedures. The relationship between administrative style and teaching performances also suggests relationships between perceived principal help and the negative relationship with grouping which we suspected may have been related to the principal's emphasis on less grouping. These are speculations which are offered simply to suggest that the obtained path coefficients and their signs reflect the behavioral world.

What is perhaps of greatest interest is the differences in these relationships as they appear by subject matter or grade level. We will return to this point at a later time when we discuss the relations of the effectiveness of the teaching performances in our summary statements.

The Relation of Support for Innovation to Organizational Structure

In this study we obtained a number of measures that would be proxies for the amount of support the system or the school provided for innovation or diversity of instruction or a variety of instructional systems. One measure was a direct support measure, the amount of district funds provided for innovation of various kinds. Another was an index derived from the number of extra teachers and aides available in the district. And a third measure was related to the teachers' perception of the principal's activity in stimulating change. It was predicted that these factors, all of which represent a desire for change in a district, would be related to organizational complexity. We were trying to determine if variation in innovation was related to variation in structure which in turn would be related to variation in teaching performance. We have reported some relations between variation in organizational structure and teaching performance. We now ask the question, What factors influence variations in organizational structure? Table 9.25 presents the path coefficients for the path between the domain, Support for Innovation, and the domain, Organizational Structure. Both grade 2 and grade 5 data for reading are presented in this table. As can be seen, the degree to which the principal is perceived as a stimulator of change is related to instructional complexity at grade 2 but is not related at grade 5. The degree of teaming is directly affected by district support at both grade levels. It is also apparent that the principal as a stimulator

Table 9.25

Path Coefficients .25 and above from the Support for Innovation Domain to the Organizational Structure Domain of Variables: Reading

Grade 2

	Cell 3: Organizational Structure				
	Instructional Complexity	Degree of Teaming	Student Consensus	Centralizing of Decision Making	Principal Help
Cell 2: Support for Innovation					
1. Number of Extra Teachers/Aides	----	----	----	----	----
2. Amount of District Funds	----	.35	----	.42	----
3. Principal Stimulates Change	-.36	----	-.51	-.34	----

Grade 5

1. Number of Extra Teachers/Aides	----	.35	----	----	----
2. Amount of District Funds	----	.28	.41	----	----
3. Principal Stimulates Change	----	----	(-.24)	----	----

of change is negatively related to the centralization of decision-making which suggests that this factor is a measure of administrative style. This relation, however, appears only at grade 2. It should be noted that the overall pattern of relations while generally in the same direction is not consistent across both grade levels.

Table 9.26 presents similar data for both grade levels in mathematics. Here notice the pattern of relations for the variable, principal who stimulates change. There is a positive correlation for grade 2 with instructional complexity and a negative correlation with degree of centralization of decision-making. This pattern we saw before at grade 2 and offered an explanation for the nature of the relationships. The amount of district funds relates to degree of teaming and positively to the degree of centralization of decision-making. This latter relationship is somewhat puzzling, but the first one seems rather obvious.

Only one relationship appears between the Support for Innovation domain and grade 5 Organizational Structure characteristics, and that is the relationship which we have seen before between the number of extra teachers and aides and the degree of teaming.

There are relationships between these district characteristics and the characteristics of the principal. These are factors that are worth pursuing. Basically, we have predicted that such factors will make a difference in how instruction is organized. It seems a reasonable conclusion that as aides, and money for aides and programs are available, change takes place in the instructional complexity. But an

Table 9.26

Path Coefficients .25 and above from the Support for Innovation Domain to the Organizational Structure Domain of Variables: Mathematics

Grade 2

Cell 3: Organizational Structure

Cell: Support for Innovation	Instructional Complexity	Degree of Teaming	Student Consensus	Centralization of Decision Making	Principal Help
1. Number of Extra Teachers/Aides	----	----	----	----	----
2. Amount of District Funds	----	.33	----	.43	----
3. Principal Stimulates Change	.41	----	-.52	-.36	----

Grade 5

1. Number of Extra Teachers Aides	----	.34	----	----	----
2. Amount of District Funds	----	(.24)	----	----	----
3. Principal Stimulates Change	----	----	----	----	----

interesting fact seems to be that this change takes place at the second grade rather than the fifth grade. If we recall the data on the relationship of performance to learning and of aptitude to performance we may see why these differences appear. In general, the teachers in fifth grade (particularly mathematics) preferred to instruct the whole class (or seemed to prefer it), used the class-as-a-whole instructional context (AP-7), and also taught in groups. These performances seemed to be related to differences in aptitude. We suspect that what we have been seeing in these data is a picture of a teaching style that occurs at the fifth grade and is relatively stable. Teachers at this grade level are not necessarily less innovative, but they may not be trying the techniques of instruction that are reflected in the instructional complexity that appears at grade 2. Or it may be that administrations have decided that the greatest emphasis in innovation needs to be made in the early grades in order to ensure that early learning takes place. We have no way of telling from the data we have presented which of these explanations is more plausible. A critical point to note, however, is that these administrative and organizational variables do have effects upon both the organization of instruction and, to some extent therefore, on the pattern of teaching performances that appear. But the relationship is most direct on the changes in the formal structure, and less direct in the pattern of teaching performances.

The Relation of Organizational Structure to Teachers' Attitudes

We have predicted that the variations in organizational structure would be reflected in teachers' attitudes. We have seen some relations between attitudes and teaching performances. Tables 9.27 and 9.28 present the path coefficients for the relations between organizational structure and teachers' attitudes; Table 9.27 for reading at both grade levels, and Table 9.28 for mathematics at both grade levels.

In grade 2, most of the relationships occur between the organizational structure variables and the teachers' perceptions of student characteristics. Interestingly, there is a positive relation between perceived principal help and the teachers' perceptions of the students' characteristics, which means that the teacher perceives the students as more teachable when he or she also perceives the principal as providing more help. Note the negative relationship between the degree of teaming and satisfaction, a relation that many people have suspected exists, although it is obviously not universal. There is only one significant path at the fifth grade and that is between the degree of centralization of decision-making and satisfaction. Interestingly enough, the relationship is positive. We saw some hint of this possibility in previous data when we were observing the pattern of performance of teachers and its relationship to their aptitude structure. There we suggested that fifth grade teachers preferred a teaching style characterized by teaching the class-as-a-whole or in groups, and we noticed relationships with those characteristics in centralization of decision making.

Table 9.27

Path Coefficients .25 and above from the Organizational Structure Domain to the Teacher's Attitudes Domain of Variables: Reading

Grade 2

Cell 6: Teacher's Attitudes

	Aspirations	Satisfactions	Perception of Student Characteristics
Cell 3: Organizational Structure			
1. Instructional Complexity	---	---	.29
2. Degree of Teaming	---	-.25	---
3. Student Consensus	---	---	.50
Teacher Perceptions of:			
4a. Centralization of Decision Making	---	(.24)	---
4b. Principal Help	---	---	.26

Grade 5

1. Instructional Complexity	---	---	---
2. Degree of Teaching	---	---	---
3. Student Consensus	---	---	---
Teacher Perceptions of:			
4a. Centralization of Decision Making	---	.34	---
4b. Principal Help	---	---	---

Table 9.28

Path Coefficients of .25 and above from the Organizational Structure Domain to Teacher's Attitude Domain: Mathematics

Grade 2

Cell 6: Teacher's Attitudes

	Aspirations	Satisfactions	Perception of Student Characteristics
Cell 3: Organizational Structure			
1. Instructional Complexity	---	---	.31
2. Degree of Teaming	---	-.26	---
3. Student Consensus Teacher Perceptions of:	---	---	.51
4a. Centralization of Decision Making	---	---	---
4b. Principal Help	---	---	.25

Grade 5

1. Instructional Complexity	---	---	---
2. Degree of Teaming	---	---	---
3. Student Consensus Teacher Perceptions of:	---	---	---
4a. Centralization of Decision Making	---	.37	---
4b. Principal Help	---	---	---

The data presented in Table 9.28 present almost an identical pattern in mathematics as was seen in reading at both grade levels; they yield path coefficients that are almost identical. This correspondence may be a reflection of the fact that we are essentially dealing with the same groups of teachers and thus one would expect to find relations to be similar.

Relations between the Principal's and Teachers' Perceptions of the Organization and Teachers' Attitudes

Tables 9.29 and 9.30 present data that relate the domains and variables in Cell 4 and Cell 5 to teachers' attitudes. Cell 4 variables include the variables that represent the principal's perception of the administrative organization and of his own administrative style, and the variables in Cell 5 represent the teachers' perceptions of the organization, of the principal's administrative style and of his or her class climate. As can be seen, the relationships in grade 2 for reading are those mainly between teachers' perceptions and teachers' attitudes. Path coefficients are positive. The positive or higher end of the administrative style variable is associated with more democratic style and the higher end of the class climate variable is associated with a more democratic class environment. In grade 5 we notice two positive path coefficients between the principal's perception of the superintendent's style, teachers' satisfaction and perception of student characteristics. The direct connections here are difficult to identify but one suspects that

Table 9.29

Path Coefficients of .25 and above from the Principal's and Teacher's Perceptions of Organization Domains to the Teacher's Attitude Domain in Reading

Grade 2

Cell 6: Teacher's Attitudes

	Aspirations	Satisfactions	Perception of Student Characteristics
Cell 4			
Principal's Perceptions of Organization			
1. Superintendent's Administrative Style	---	---	---
2. Principal's Administrative Style	(-.24)	---	---
Cell 5			
Teacher's Perceptions of Organization			
1. Principal's Administrative Style	---	.33	.25
2. Class Climate	.32	.44	.33

Grade 5

Cell 4			
Principal's Perceptions of Organization			
1. Superintendent's Administrative Style	---	.29	.45
2. Principal's Administrative Style	---	---	---
Cell 5			
Teacher's Perceptions of Organization			
1. Principal's Administrative Style	---	.47	---
2. Class Climate	---	---	.25

Table 9.30

Path Coefficients of .25 and above from the Principal's and Teacher's Perceptions of Organization Domains to the Teacher's Attitude Domain in Mathematics

Grade

Cell 6: Teacher's Attitudes

	Aspirations	Satisfactions	Perception of Student Characteristics
Cell 4			
Principal's Perceptions of Organization			
1. Superintendent's Administrative Style	---	---	---
2. Principal's Administrative Style	-.25	---	---
Cell 5			
Teacher's Perceptions of Organization			
1. Principal's Administrative Style	---	.39	.44
2. Class Climate	.44	.43	.25

Grade 5

Cell 4			
Principal's Perceptions of Organization			
1. Superintendent's Administrative Style	---	.28	.46
2. Principal's Administrative Style	---	---	---
Cell 5			
Teacher's Perceptions of Organization			
1. Principal's Administrative Style	---	.44	---
2. Class Climate	---	---	.25

there is likely to be a congruence between the principal's administrative style and the superintendent's style. To the degree that the teachers perceive this congruence and the congruence is a style that they find acceptable, the more satisfied the teachers will be. This interpretation is, of course, stretching for an explanation. From the standpoint of further analysis, obviously we are finding enough substantial relations in these domains that they need to be considered seriously in any analysis of teaching and its effect on learning.

The same pattern of relations appears in Table 9.30. Again this should not be surprising since we are analyzing the data from essentially the same group of teachers.

The Relation of Student Aptitude, Attitudes and Expectations to Student Learning

Throughout the preceding discussion, we have been looking at the relations of the teaching performance variables to pupil behavior and to student learning, and at the relationship of other independent variables to teacher performance. We have not to this point considered the right-hand side of the diagram of the structural model in Figure 6.1. In that portion of that structure we have one-step paths from student factors to student learning. The path coefficients will be the partial correlation of a factor with student learning, partialling out its correlations with other factors. Tables 9.31 to 9.36 present the path coefficients by factor. Thus Tables 9.31 and 9.32 present

Table 9.31

Path Coefficients .25 and above from the Student Verbal Aptitude and Cognitive Style Domains of Variables to Pupil Learning: Reading

Grade 2

Cell 11: Pupil Learning

	CAT Reading Comprehension	Reading Application	Decoding	Reading Achievement	Total Reading
Cell 9					
Student Aptitudes					
9a Verbal Aptitude	---	---	---	---	---
9b Cognitive Style	+.37	---	---	---	---
		Grade 5			
9a Verbal Aptitude	---	---	-.27	-.27	---
9b Cognitive Style	---	---	---	+.28	+.26

Table 9.32

Path Coefficients .25 and above from the Student Verbal Aptitude and Cognitive Style Domains of Variables to Pupil Learning: Mathematics

Grade 2

Cell 11: Pupil Learning

Cell 9	CAT Math Concepts	CAT Math Computations	Math Application	Total Mathematics
Student Aptitudes				
9a Verbal Aptitude	---	---	---	---
9b Cognitive Style	+.27	+.48	+.23	+.55
Grade 5				
9a Verbal Aptitude	---	---	---	---
9b Cognitive Style	---	---	---	---

the data relevant to student aptitudes, separately for reading and mathematics. Both grade levels are represented in each table. The reader should remember that these correlations are with mean gain scores and that, effectively, the influence of the fall score has been "removed." In this case, therefore, one will see correlations somewhat lower than one is used to seeing because a factor may be how to correlate it with fall scores. This case is apparent when we look at the student aptitude factors. We note that for verbal aptitude there is no relation to grade 2 reading, and there are negative relations to decoding and reading achievement at grade 5. Cognitive style has generally positive, but few significant relationships with reading scores. In mathematics there are no relationships with verbal aptitude scores at grade 2 and grade 5. There are relationships between cognitive style and achievement in mathematics at grade 2 but not at grade 5. Generally, the pattern for grade 2 means that children who have scores in the direction of field independence are doing better in mathematics, a relationship which is not surprising given that scores in the direction of field independence suggest analytic thinking which presumably would be relevant to the learning of mathematics.

Tables 9.33 and 9.34 present the data on the relations of attitudes to the outcome measures. There are relatively few relations in reading though there are more between spring attitude and outcome measures than between fall attitude and outcome measures. This suggests the conclusion that perhaps it is the change in the students' attitude or

Table 9.33

Path Coefficients .25 and above from the Student Attitude Domain of Variables to Pupil Learning: Reading

Grade 2

Cell 11: Pupil Learning

	CAT Reading Comprehension	Reading Application	Decoding	Reading Achievement	Total Reading
Cell 10					
Student Attitudes					
1. Fall Attitude	---	---	---	-.32	---
2. Spring Attitude	---	---	---	+.57	+.25
		Grade 5			
1. Fall Attitude	---	---	---	---	---
2. Spring Attitude	---	(+.24)	---	(+.24)	+.34

Table 9.34

Path Coefficients .25 and above from the Student Attitude Domain of Variables to Pupil Learning: Mathematics

Grade 2

Cell 11: Pupil Learning

	CAT Math Concepts	CAT Math Computations	Math Application	Total Mathematics
Cell 10				
Student Attitudes				
1. Fall Attitude	---	+.31	---	+.32
2. Spring Attitude	---	---	+.33	+.32
		Grade 5		
1. Fall Attitude	---	-.41	-.47	-.45
2. Spring Attitude	---	+.43	+.39	+.43

at least what the students' attitude is at the end of the year, that is more predictive of learning than was the students' attitude at the beginning of the year. If that speculation is reasonably valid, then it suggests that the role of the teacher may be critical in influencing that attitude. (The reader should read Volume IV for the relationship between teaching performances and attitudes, where the greatest amount of data on that relationship is provided.)

In mathematics, there are more relationships than were found in reading, particularly at grade 2. The relationships follow the same general pattern, that is, spring attitude scores are positively related to outcome measures. But an interesting pattern of relations appears in grade 5 where the relations with fall attitudes are negative. It is difficult to explain this pattern of relations.

Tables 9.35 and 9.36 present the data on student expectations. The relationships here are as puzzling as are those for attitudes. What seems reasonable to conclude is that factors such as attitudes and expectations do have an influence on learning but the pattern here is inconsistent from what we would expect. It is reasonable to hypothesize that it is the change in attitude or expectation rather than the level of the attitude or expectation score that may be a factor more significantly related to student learning.

Summary

We will not attempt to summarize all the relationships found in the analyses presented in this chapter. In the concluding section of

Table 9.35

Path Coefficients .25 and above from the Student Expectations Domain of Variables to Pupil Learning: Reading

Grade 2

Cell 11: Pupil Learning

	CAT Reading Comprehension	Reading Application	Decoding	Reading Achievement	Total Reading
Cell 16					
Student's Expectations					
1. Fall Expectations	-.54	---	---	-.56	---
2. Spring Expectations	---	---	---	+.25	---
		Grade 5			
1. Fall Expectations	---	-.41	-.27	---	-.31
2. Spring Expectations	---	---	+.40	-.26	---

Table 9.36

Path Coefficients .25 and above from the Student Expectations Domain of Variables to Pupil Learning: Mathematics

Grade 2

Cell 11: Pupil Learning

	CAT Math Concepts	CAT Math Computation	Math Application	Total Mathematics
Cell 16				
Student Expectations				
1. Fall Expectations	---	---	---	---
2. Spring Expectations	---	---	-.55	-.43
Grade 5				
1. Fall Expectations	---	---	---	---
2. Spring Expectations	+.27	---	---	---

this volume we will attempt to tie together the results obtained in the analyses presented in Chapters 7 and 8 and those presented here.

But a point that needs commentary is the relevance of a structural model that was used in the analysis of the data. If we had found relatively few relationships, we would be reasonably certain that the model used to analyze the data probably was a poor fit on the data. We have found moderate to substantial path coefficients between all of the domains and the predicted relations. From these relations we have a fairly good idea of the structure of performance in relationship to the environment in which it takes place and in relation to the characteristics of the teachers whose performances were observed.

The model probably should be changed in two respects. We have treated the teaching performance and pupil behavior variables in this first analysis as a collection. Then we separated them in the structural analysis and found, in general, that the pupil behaviors were not an impressive collection of predictors. Probably a better model would be one in which certain teaching performances were predicted to affect pupil behavior and other teaching performances would be predicted to affect learning. A model of this kind would clarify the relationship between a performance which is controlling attentiveness or in-class productivity and a performance whose effect is directly on learning such as an instructional performance variable. It is obvious that the analysis here has enabled us to begin to generate more complex and more sophisticated models. We can visualize the possibility of relationships within the performances themselves since we have seen data that suggest the performances tend to go together in clusters.

Another change that might give a model that yields a more predictive relationship would be one in which we connect by paths the teaching performance variables and such factors as student attitudes and student expectations. The difficulty in explaining the patterns of relations in student factors to student learning may be associated with the fact that we are depending too heavily in this model on internal arrangements among these factors and are in fact ignoring their relations with external factors such as teaching performances. Thus, the pattern in which we see a negative relationship between a fall attitude or expectation in learning and positive relationship between spring attitude and expectation in learning may be directly related to the character of teaching performances.

It should not be overlooked that, in general, the model provides a substantial picture of the pattern of relations among the various domains of variables, and that a generally consistent trend runs through the path coefficients which indicates that the predictions are in the right direction. Thus, the model has been tested as a reasonable approximation to a theory of teaching in which the role of teaching performances is fairly clearly seen.

BEGINNING TEACHER EVALUATION STUDY:
PHASE II FINAL REPORT

Volume I: Chapter 10

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

The reader may notice that we have switched from the convention of describing one set of scores as mean "difference" scores to using the more precise technical term, mean "gain" scores.

This chapter summarizes the results of Phase II of the Beginning Teacher Evaluation Study. The conclusions and recommendations as well as the discussions of the results of the study are drawn from all of the volumes of the study. The results of this study are summarized under three major headings: (1) What have we learned about the relationship of teaching performances to children's learning; (2) What factors significantly influence teaching performance; and (3) What methodological innovations in this study seem particularly useful for future research. The second section of this chapter summarizes the results of special studies within the total study.

The Effects of Teaching Performance on Children's Learning

In this study two types of scores which are indices of gain in learning have been used, residual scores and mean gain scores. The advantage of using a residual score is that the influence of fall scores is removed from the spring scores, and therefore the influence of teaching performance on spring or final scores is measured independently of the correlation of spring scores with fall scores. Fall scores are also correlated with such factors as the socioeconomic status of the children and measures of aptitude. The effect of these correlations on spring scores is removed in part by partialling out

fall scores. The residual score is, therefore, a relatively "pure" measure of end-of-year status. A correlation between teaching performance scores and residual scores is a fairly strong indicator of the relationship of that performance to the scores.

Mean gain scores represent the average of the gains of all students across the year. The difference between scores tends to be somewhat less reliable than the original scores. But, given this somewhat lower reliability, correlations between teaching performances and mean gain are to be taken seriously. The mean gain scores also takes into account the initial position of the student. We may, by using mean gain scores, compare two students or two classes who began at the same level of performance in the fall in terms of where they ended in the spring.

Except for differences in their statistical properties, both scores are giving similar kinds of information. Both are measures of gains, though each estimates those gains in different ways. The underlying assumption in this study, however, is that differences in gains are meaningful indicators of learning. In this study we have looked at the relation of teaching performances to two estimates of gain. Since these two types of scores were used, a comparison of the results produced by using the two different types of scores is useful.

For the purposes of interpretation, however, several different approaches can be used. We may consider the results by residual scores separately, and from these analyses we will identify those teaching performance variables which correlate with residual scores. The interpretation of such a correlation is that the performance variable

is related to final status independently of the influence of fall scores on the spring scores. We may also identify those teaching performance variables which correlate significantly with mean gain scores. The interpretation in this case is that these teaching performance variables may be significant influences on gains, but we are somewhat less certain about the relative influence of other factors on those gains. The most sensible and conservative interpretation is one that compares the results obtained by using residual scores with those obtained by using mean gain scores. A teaching performance variable which correlates with both types of scores is likely to be a significant influence on children's learning.

Types of Analyses

Several different types of analyses were performed in this study. The basic technique is that of multiple regression. But in using multiple regression the variables were considered one at a time, that is, the relationship of a single performance to an outcome measure was studied. The variables were grouped by instruments to determine if there was a systematic effect by instrument; that is, we asked, was one instrument yielding more significant relationships than another? A third analysis considered all of the performance variables as a group. This type of analysis tells us the extent to which the collection of performances is in and of itself a significant correlate of the two types of scores.

It is important to know the extent to which teaching performances as a group make a difference in relationship to children's learning. The reason that such information is significant is that it enables us

to consider the effects of performance in relation to the effects of other kinds of factors. If performances as a group make a significant difference, then teaching per se is a critical factor in learning. If performances as a group do not make a significant difference in children's learning, we then attempt to determine whether or not differential patterns of teaching performance account for differences in learning.

Similarly, the logic of analyzing performances one at a time is to determine whether or not one or more single performance is significantly related to learning. If we were to find such a relation across all teachers or across second grade teachers or across teachers who are teaching reading, then that performance is one that should be seriously considered as an essential component of teaching skill.

General Conclusions

There are several general conclusions which emerge from all of the analyses that have been performed. These conclusions relate to questions which have been of interest for some time in research on teaching. The history of research on teaching, for example, has been characterized by the attempt to find general teaching skills which significantly influence learning. Did we find any single teaching skill which significantly correlated with learning in both reading and mathematics and at both grade levels? No such skills were found. Performances which correlated significantly with outcomes were different by subject matter and by grade level.

This result, if replicated, or if found in comparable studies, is an important one. It indicates that the pattern of effective teaching performances will differ by subject matter and probably by grade level. The practical implications of such a conclusion are obvious; the goals of training teachers in the primary grades and the intermediate grades will necessarily be different.

Such a result is not entirely surprising for two reasons. First, the developmental level of children in the second and fifth grade is usually different. Second, the processes being acquired in reading and in mathematics are different in character. The child learning to read is acquiring processes, such as decoding skills, or skills in deducing and inferring which are relatively independent of the content of the material being read (they certainly are independent of the content of most reading materials provided in the elementary school). The child learning mathematics, however, is learning a series of discrete skills and is building a concept matrix which enables him or her to understand more complex instances of a general concept.

Different variables are likely to be critical for facilitating these different kinds of learning. To decode requires the child to identify a visual symbol in a context, and to link a sound with that symbol. Variables which facilitate cue discrimination and pairing of cues and responses are likely to be critical in this kind of learning. In adding numbers, however, the child performs a set of discrete operations sequentially which are instances of a class of operations, and for which an algorithm determines the sequences to be performed. Variables which facilitate learning of categories and symbol trans-

formations are likely to be critical for this kind of learning. It should not be surprising, therefore, that different teaching performances are likely to be effective in teaching reading and mathematics.

Another general conclusion may be drawn from the data and that is that differences in patterns of teaching performances account for differences in pupil learning. Multiple correlations were obtained across all the analyses. When all variables were considered as a group, significant relations were found in only two of 16 instances, at grades two and grade five for mathematics (the relationship for grade two mathematics was somewhat weaker). But 15 of 16 stepwise regressions at all levels yielded significant multiple correlations. Since the stepwise regression takes into account the relative contribution of all teaching performance variables with respect to each other and since patterns emerged in these analyses, it is a reasonable conclusion that what one should be looking for in the study of teaching are certain kinds of patterns of performance which make a difference in children's learning.

Because a few more significant relationships were found between teaching performance variables and learning in mathematics than in reading, one could conclude that teaching performance is a more significant variable in mathematics than in reading. This conclusion is an extrapolation from the data since the methodology does not directly compare the influence of specific teachers on the same students when those teachers are teaching mathematics and when they are teaching

reading. The extrapolation, however, does not take one far beyond the data available in this study.

Another interpretation of these same data is that the teaching of reading may require less diversity in teaching skill than the teaching of mathematics. The learning of reading requires the acquisition of a set of cognitive processes to be used across a variety of reading materials. Effective teaching of these processes may require fewer skills, but these skills need to be used consistently with a variety of different reading materials. The learning of mathematics in contrast is closely tied to the content of mathematics, and different skills may be required to teach algebraic, geometric, and the statistical concepts and operations relevant to using them.

The design of this study did not permit a test of these hypotheses. Further, it should be remembered that these ideas are derived from data that involved measurement of a limited range of learning effects both in reading and mathematics. But the absence in the results of a finding that would support the concept of effective, general skills of teaching should be given particular attention.

Those same tables also indicate that relatively few teaching performance variables when considered alone relate significantly to either type of score. The largest number obtained in any analysis by single performance was four variables. This result suggests that there are no single teaching performance variables which in themselves correlate so significantly with children's learning that they should be considered critical in teaching.

The general picture that emerges from these data is one which has two features; one, a pattern of teaching performance is more likely to be related to learning than a single performance or an undifferentiated group of performances. The other feature of this picture is that these teaching patterns will differ by subject matter and by grade level. They may also differ with respect to the characteristics of individual students; however, the study to this point has not performed the relevant analyses to answer that question.

Another general conclusion is of particular significance. Teacher effects were obtained in this study in a substantial proportion of the analyses. In general, fall scores account for 70 to 80% of the variance in spring scores. But significant correlations were obtained when spring scores with fall scores partialled out were regressed on teacher performances (residual scores regressed on performance scores), and when mean gain scores were regressed on teacher performance scores. The range of significant correlations was from .33 to .80; thus teacher-performance variables account for from 11% to 64% of the variance in the pupil scores. When residual scores were used in these analyses, correlations ranged from .56 to .72; for mean gain scores, correlations ranged from .33 to .80. Considering only residual scores, the performance variables account for 31% to 52% of the remaining variance u[illegible]nted for after fall scores are partialled out.

The significance of these results should be related to the meaning of partialling out fall scores. This procedure "discounts" the effect of the initial position of the learner. Or, initial position plus

teacher effects accounts for almost all the variance in final scores. These statements should not be interpreted to mean that the correlates of initial position such as the socioeconomic status of the learner are irrelevant. But, although such factors are substantially related to final scores, teacher performances also contribute significantly to them. The clearest picture of the relations among these factors is likely to be revealed when we study the interactions among them.

In this study a variety of analyses were performed with two kinds of scores and with two groups of teachers, one a subset of the other. The "Total Group" is the entire teacher sample at a grade level; the "Discriminant Group" are those teachers who taught reading or mathematics to ten or more children. Multiple regression analyses were performed as well as stepwise regression analyses. The problem is to decide how to interrelate these analyses.

One way is to look for consistency across all the results. This procedure has been used in the preceding chapters. In summarizing, however, we have chosen a different procedure. We interpret the results first by looking at the stepwise regression analyses. These analyses yield prediction equations in which the relative contribution of each teaching performance variable is apparent. The method also determines which of the variables in combination give the best prediction. In computing, predictors (teaching performances) are entered successively; beyond a certain point, it becomes apparent that adding more predictors will not improve the prediction equation.

Against the frame of reference provided by the stepwise regressions, we then look at the multiple regressions for variables that may not have appeared in the stepwise regressions. Thus two kinds of information are summarized: 1) the best combination of predictors (teaching performances); and 2) other predictors probably worth considering for future research.

From a practical point of view, it is probably better to use stepwise regression analyses since they indicate the relative or comparative contribution of variables both positively and negatively, and take into account the correlations among the variables. The results also suggest differential patterns which may be effective or ineffective. In the following sections the data from the stepwise regressions are presented first and are followed in a later section by the results of the multiple regression analyses; then both analyses are summarized and interpreted.

Table 10.1 lists the teaching performance variables found to be significantly related to pupil learning in reading and mathematics at grades 2 and 5. This list is drawn from the stepwise regression analyses performed with both groups of teachers, the total group (grade 2: NR = 40, NM = 41; grade 5: NR = 53, NM = 54) and the discriminant group (grade 2: NR = 33, NM = 37; grade 5: NR = 41, NM = 45). The reader may recall that the discriminant group was discussed in Chapter 7 and that the text and tables for the total group are presented in Appendix C. The summary presented in this chapter is drawn from both of those sources. Listed to the right of the table is the number of times a variable appeared as significant in the analyses.

TABLE 10.1

SIGNIFICANT TEACHING PERFORMANCES FROM THE STEPWISE REGRESSION ANALYSES OF THE TOTAL AND DISCRIMINANT GROUPS OF TEACHERS

	TOTAL GROUP GR 2: NR = 40; NM = 41 GR 5: NR = 53; NM = 54				DISCRIMINANT GROUP GR 2: NR = 33; NM = 37 GR 5: NR = 41; NM = 45				TOTAL NUMBER OF SIGNIFICANT PREDICTORS	
	Residual Scores		Mean Gain		Residual Scores		Mean Gain			
	+	-	+	-	+	-	+	-	+	-
READING										
2	R-3	WD-4 R-2	N.S.	N.S.	R-3	WD-1 R-2	WD-5 R-3 AP-1	WD-1 R-2 AP-12	R-3(3) WD-5(1) AP-1(1)	WD-1(2) WD-4(1) R-2(3) AP-12(1)
5	R-4 AP-10	WD-5 R-3 AP-2	N.S.	AP-8	R-4	WD-1 R-3 AP-1 AP-2	N.S.	AP-2 AP-8	R-4(2) AP-10(1)	WD-1(1) WD-5(1) R-3(2) AP-1(1) AP-2(3) AP-8(2)
MATHEMATICS										
2	WD-2	WD-4 AP-7 AP-12	WD-2 WD-3 R-1 AP-13	WD-4 WD-5 R-4 AP-2 AP-6 AP-7 AP-9	WD-2 AP-11	WD-4 AP-7	WD-2	WD-4 AP-2 AP-9	WD-2(4) WD-3(1) R-1(1) AP-11(1) AP-13(1)	WD-4(4) WD-5(1) R-4(1) AP-2(2) AP-6(1) AP-7(3) AP-9(2) AP-12(1)
5	WD-4 AP-6 AP-7 AP-13	WD-5 AP-1 AP-2 AP-3	WD-4 R-2 AP-6 AP-7 AP-10 AP-13	R-4 AP-1 AP-2 AP-3	WD-4 AP-10 AP-13	WD-1 R-3 AP-2	WD-4 AP-6 AP-13	WD-1 AP-1 AP-2	WD-4(4) R-2(1) AP-6(3) AP-7(2) AP-10(2) AP-13(4)	WD-1(2) WD-5(1) R-3(1) R-4(1) AP-1(3) AP-2(4) AP-3(2)

Significant Teaching Performance Variables - Grade 2 Reading

Consider first stepwise regression analyses using residual scores. When, in a stepwise regression using the total group, spring scores were regressed on teaching performance variables with fall scores partialled out, a multiple correlation equal to .59 ($p \leq .01$) was obtained. Thus performance variables are accounting for about 35% of the variance in spring scores when fall scores are partialled out.

One positive predictor was obtained in this analysis, a variable that is a measure of the degree to which a teacher uses different kinds of teaching materials (R-3). Two negative predictors appeared, WD-4, a measure of the complexity of the organizational structure of the classroom, and R-2, an index of the time pupils spend acquiring and practicing skills (two of the several goals of instruction in R-2).

An interpretation of these results is suggested by the correlations among the variables. A correlation of $r = .26$ was found between WD-4 and R-2. R-2 and R-3 correlate positively and substantially ($r = .61$). Thus some teachers attempting to provide more skill practice (R-2) were also using more materials (R-3). But if a teacher is also using a variety of instructional contexts (WD-4) and trying to provide more skill practice (R-2), the use of more materials (R-3) probably interferes with the efficiency of the instruction.

Alternative hypotheses may be derived by considering the composition of the WD-4 score. WD-4 includes several elements, including classroom organizational patterns and the proportion of pupils taught exclusively

by the teacher. Of these elements, the discrete contribution to the score provided by the proportion of the pupils taught exclusively by the teacher was associated positively with pupil academic growth on two of the reading measures as well as with the total reading score.

Specific organizational patterns were sometimes positively and sometimes negatively associated with pupil reading achievement. Individualized instruction was negatively related to scores on the reading applications components of the test battery as was simultaneous instruction of all pupils. Simultaneous instruction, however, was positively associated with scores on the decoding skills component. Grouping pupils by their general level of reading ability was positively related to growth in reading application skills.

WD-4 appears to be a proxy for the proportion of children for which the teacher provides direct instruction and the grouping methods used to organize students for this purpose. There are probably a variety of such patterns, many of which appear to be ineffective. The area to be explored is the variation in patterns of grouping, and in which of these the teacher provides direct instruction. Similarly, R-2 has several components including the introduction of new concepts and facts, practicing skills and facts, and reviewing skills and facts. Although "practicing facts and skills" was the largest single component of the R-2 score, the other components are represented in an R-2 score. These scores, as are all the scores of performance categories, are vector scores which take into account the intercorrelations among the components. Each of the components of R-2, R-3, and WD-4 might be

thought of as a variable in an hypothesis to be tested. An hypothesis to be tested, for example, might be that while a variety of materials in itself may be a positive predictor of reading skill growth (R-3), the use of several kinds of materials cannot effectively be combined as a teaching strategy with an emphasis on practicing skills and facts (a component of R-2) and a grouping and regrouping of pupils for instruction (a component of WD-4).

In future research, the kind of instructional grouping, the proportion of pupils taught in these groupings by the teacher (WD-4), and the type and proportion of pupil activities in the groups (R-2) should be considered as possible variants that relate to the use of a variety of materials (R-3) in second-grade reading instruction.

If we consider the results of the stepwise regression analyses using residuals scores for the smaller group of teachers (discriminant group), we again find R-3 is a positive predictor and R-2 is a negative predictor. But WD-1, time spent preparing for and teaching reading, has replaced WD-4 as a negative predictor.

WD-1 and WD-4 are correlated moderately, $r = .21$. They may be joint measures of the amount of time the teacher acts as the instructor in different groupings of students. WD-1 and AP-6 (teacher-group) are negatively correlated, $r = -.40$. Thus WD-1 is probably a measure of the amount of instructional time provided individual students. One component of the WD-4 score is the amount of individualized instruction provided, and this single component was negatively correlated with reading application scores ($r = -.37$). We are obviously tracing our

way through a complex of relations, but a reasonable conclusion from this examination of these scores is that WD-4 and WD-1 may be proxies for independent seatwork arrangements in which the teacher is attempting to provide direct instruction for each pupil.

The stepwise regression of mean gain scores on teaching performances for the total group yielded nonsignificant results. We find that when mean gain scores are regressed on teaching performance for the discriminant (smaller) group, $R = .77$ ($p \leq .01$). Thus the performance scores are accounting for 59 percent of the variance in mean difference scores. (Note that performances account for more of the variance in mean gain scores than in residual scores, but in both cases performances account for a substantial proportion of the variance in the scores.)

The positive predictors obtained in the stepwise regression are R-3 (the use of a variety of teaching materials), AP-1 (pupil productivity during reading instruction, and WD-5 (variety of materials). The negative predictors are R-2 (an index of the time pupils spend acquiring and practicing skills), WD-1 (time-spent on preparation and instruction), and AP-12 (direct responsiveness to individual pupil performance or behavior).

The use of different materials is common. Its relation to gains indicates that at second grade this component of teaching performance is generally effective. Of particular interest in that respect, however, is that two teaching procedures also commonly used are ineffective, and in fact are predictors of lower scores; attempting to provide more skill practice during a period (R-2), and responding to individual pupils using the materials (AP-12).

The scores represented in R-2 are weighted with the instructional goal of providing practice. Presumably, much of second grade reading is aimed at teaching decoding skills; the picture that emerges is of a teacher with a class of 15 to 25 children working on different materials on which they are to practice reading skills. The teacher periodically responds to a question on the reading materials (AP-12).

The teacher walks around the room, stops when a child asks a question, responds and then moves on. The interaction seems to be a form of indirect instruction, that is, instruction prompted by pupil behavior. This type of performance is to be contrasted to the kind in which the teacher uses interactions with children to enhance understanding, or to elicit a rule that the teacher helps the child to apply by additional questions. AP-12 is an indicator of a low-level instructional reaction to the children.

R-2, weighted by pupil skill practice, is an indicator that the teacher may be introducing new material, reviewing, and providing practice. Teachers with higher scores on R-2 may be attempting to do all of these during a period. High scores are probably indicators of a confused lesson; or they may be indicators of the difficulty of managing a system in which different children are working on different materials for different purposes. In either case, an appropriate inference is that the instruction should be focused for specific periods of time, and that the relation of one type of activity to another needs to be orchestrated carefully.

Refer to the right-hand column in Table 10.1. Listed there is the frequency of occurrence of each of the positive and negative predictors

across these analyses. The three most frequent predictors are R-3(+), variety of materials, WD-1(-), time spent in preparing and teaching and R-2(-), time spent acquiring and practicing skills during the period.

It is obvious that variety of materials (and one suspects their appropriateness) at the second grade is a critical component in producing significant gains in reading. WD-5, another index of variety of materials, also appears as a positive predictor. Why variety of materials is consistently effective is a matter of speculation. It may be that part of the effectiveness of this variety of materials is that they are self-instructional. When materials that are of that character are used, they compensate for the problems teachers have in providing direct instruction to pupils. Higher scores on this variable may be an indicator of teachers who have better diagnostic skills and who adapt the materials to the children's needs or level of skill.

It is also of interest that WD-1, time-spent on teaching (a complex measure that includes both the amount of time the teacher spends preparing for and actually teaching reading), WD-4, the variety of the instructional contexts, and R-2, time spent acquiring and practicing skills period, all appear as negative predictors. One sees a picture of a teacher attempting to provide most if not all of the instruction by himself or herself, trying to achieve several different goals, combined with an interactive pattern, AP-12 which describes the teacher who

reacts to children's questions rather than initiating interaction. Such teachers would have higher scores on WD-1, WD-4, R-2, and AP-12. Since all of these variables are negative predictors, such teachers' pupils are likely to make smaller gains.

A few paragraphs above we suggested that R-3 (variety of materials) may be associated with other performances which in a pattern account for greater gains in reading. This possibility was tested.

The reader will recall that we found a pattern in the gains. Regressions of spring scores on fall scores were computed by class. This analysis yields two pieces of information about each class. One of these, the slope of the regression line, is related to the size of the correlation between fall and spring scores. The other, the intercept of the regression line, is a function of the amount of gain between fall and spring. When these two numbers are plotted, an interesting pattern is revealed.

There is a range in the size of the intercept, which means that some classes made large gains, some small gains, and the others fell in between. There is variation in the slopes, some large, some small, the rest in between. This pattern is one in which shallow slopes go with large intercepts and large slopes with small intercepts. Practically, this pattern means that some classes are making substantial gains and that students at both ends of the score scale are making gains, with those initially at the higher end making somewhat larger gains. At the other end of the pattern are classes making relatively small gains, and most of this gain is being made by students who began with initially

higher scores. In between are classes with substantial gains and in which the correlation between initial and final performance is high, so that we may say that in these classes the best predictor of where students will end is their initial scores.

The critical question, of course, is whether or not teaching performances will account for the differences in position along the coordinates of the slope-intercept axes. If some classes differ markedly from others in their performance, and if reasonable statistical controls are used to assess these differences, then we have found an important item of information. The assumption underlying making an analysis of this kind is that some teaching performances will be more effective than others and that these differences in effectiveness will show up in differential pupil performances. If teaching performances can be found that relate to these differences, we have a strong case for the relevance of these performances to differential changes in how much children learn.

Do teaching performances account for these differences in the slope-intercept pattern? In a stepwise regression of scores associated with these patterns on teaching performances using the discriminant (smaller) group, $R = .96$ ($p \leq .001$), and $F^2 = .92$. Thus, the differences in the two slope-intercept patterns are accounted for almost entirely by 16 teaching performance and pupil behavior variables as follows:

Positive Predictors	Negative Predictors
WD-4	WD-1
WD-5	WD-2
R-3	WD-3
AP-1	R-1
AP-5	AP-2
AP-10	AP-6
AP-13	AP-8
AP-14	AP-12

Let us group the positive predictors as follows:

Pupil Behavior: AP-1

Instructional Organization: AP-5, WD-4

Instructional Activity: AP-10

Teacher-Pupil Interaction: AP-13, AP-14

Instructional Materials: WD-5, R-3

Higher scores on these variables predict a pattern of small slopes and large intercepts. This pattern is one in which greater gains are made and in which pupils at all points along the initial score range are making gains.

The instructional pattern reflected in the positive predictors is one in which the children are placed in independent seatwork (AP-5), but the teacher interacts with them by sustained discussing and explaining (AP-10), keeps them on task by redirecting them to the task (AP-13), and uses a greater variety of materials (R-3, WD-5). AP-14 (moves on, ignores) is positively correlated with AP-10, $r = .36$;

these two variables appear to be components of an interactive complex. Note also that AP-1 (Good Pupil Reading Performance) appears in this set, and is probably a proxy for on-task behavior.

The presence of WD-4 in this list is an anomaly. In the other analyses where WD-4 was a negative predictor, we were considering only the gain scores and not their patterns. We suspect that teachers with high scores on WD-4 also carry the instruction in the arrangement described above; but there may be other teachers who also have high scores but use other grouping arrangements. The pattern of high scores which includes WD-4 predicts a positive type of pupil performance pattern in reading; but WD-4 in general predicts less gains in reading. The components of WD-4 warrant analysis in future research.

The negative predictors may be grouped as follows:

Pupil Behavior: AP-2
Instructional Organization: AP-6
Instructional Activity: AP-8
Teacher-Pupil Interaction: AP-12
Instructional Time: WD-1, R-1
Instructional Content: WD-2, WD-3

Higher scores on these variables predict a pattern of large slopes and small intercepts. This pattern is one in which relatively small gains are being made, and most of the gain is being made by pupils who began with initially higher scores.

The children are taught in groups (AP-6); there is a higher level of inattentiveness (AP-2); the teaching activity is more organizing of

instruction (AP-8) than direct instruction; the teacher responds to pupil-initiated questions or pupil behavior, a form of indirect instruction (AP-12). WD-1 and R-1 (teaching time) suggests that instructional time in reading is being spent by the teacher directing these activities. WD-2 suggests that teachers are teaching several kinds of content areas and using specific strategies, materials and activities for each of the content areas (WD-3).

These positive and negative predictors suggest contrasting teaching styles. Teachers with higher scores on the positive predictors are more frequently acting in these ways; similarly teachers with higher scores on the negative predictors are more frequently acting in those performances. The predictors predict the location of a teacher's class in different groups which are characterized by differences in patterns of mean gains.

This analysis suggests that it is patterns of these kinds that may explain differences among teaching performances. We find that R-3, variety of materials, is a consistent predictor of gains across a variety of analytical approaches, but is the only positive predictor in some. We can understand the meaning of this result if we can relate R-3 to other performances which constitute a pattern of positive predictors. But this latter step is likely to be fruitful only when we find a pattern in the gains themselves.

Significant Teaching Performances - Grade 5 Reading

When residual scores were used in a stepwise regression analysis for the total group, an $R = .56$ ($p < .02$) was obtained. $R^2 = .31$ which indicates that performance variables are accounting for 31 percent of the variance in spring scores when fall scores are partialled out. Note again that this is a substantial contribution in the variance analysis.

In this analysis, two positive predictors were obtained. AP-10 which is a measure of the extent to which the teacher discusses, explains, questions and answers in a sustained fashion, and R-4 which is heavily weighted with directed pupil seatwork. Thus, teaching performances in which the teacher interacted with the pupil in direct instruction were both positive predictors. Negative predictors were WD-5, the diversity of material, R-3, also a variety of instructional material, and AP-2, pupil inattentiveness.

The pattern that appears here is one in which the two critical performance variables are those that involve direct instruction by the teacher. In AP-10 we see what the character of this instructional activity is that is effective. Reading in the fifth grade involves more sustained reading of more complex material on the part of the pupils. Teachers generally are working on the development of reading comprehension. Given the general character of the materials and the goals of instruction at the fifth grade, the relevant instructional activity appears to be teaching performances in which teachers interact by discussing the material, asking questions about it, answering

questions about it, explaining what is involved in the material in a sustained and systematic fashion. In other words, the teacher becomes involved in the substance of the material, and works with the pupil in an effort to improve the student's understanding of that material. Presumably in this process, though our data do not indicate so directly, the teacher is illustrating how to analyze the reading materials, how to make sense out of them, how to use one's knowledge to understand what has been written and in general how to comprehend the reading materials.

It is interesting that in grade 5 a variety of teaching materials as measured by two scores obtained by different instruments (WD-5 and R-3) are both negative predictors. The character of the instruction required to improve reading comprehension at this level requires a sustained interaction with pupils. The teacher who uses a diversity of materials may effectively reduce the amount of time that can be spent working with different children in sustained interactions about any given set of materials.

If this speculation has some validity, one conclusion would be that the critical factor is how the pupils and teachers interact with the materials rather than the diversity of the materials themselves. Presumably pupils are learning complex skills. Although one suspects that the material has to be appropriate to the interest and level of skill of the student, too great a diversity of material begins to interfere with the basic instructional activity required to achieve the instructional goals.

The appearance of AP-2 (pupil inattentiveness) as a negative predictor is an interesting result partly because it corresponds with common sense; but throughout the many analyses performed in this study pupil behavior has only occasionally appeared as positively or negatively correlated with reading scores. The appearance of AP-2 here, therefore, is more noteworthy. If reading comprehension is facilitated by sustained attention to the materials and by sustained interaction with the teacher, inattentiveness obviously interferes with maintaining cognitive attention and focus.

The stepwise regression of mean gain scores on teaching performances using the total group yielded no positive predictors and one negative predictor, AP-8. AP-8 is a measure of the amount of time the teacher spends organizing and managing instructional activities. The differential effects of sustained instruction, AP-10, and managing, AP-8, is noteworthy; the former is a positive predictor (for residual scores), the latter a negative predictor (for mean gain scores).

When the stepwise regression analyses were performed with the scores of the discriminant group using residual scores, the results were similar to the results obtained with the total group. R-4 (directed seatwork) is again a positive predictor (but AP-10 does not appear). R-3 (variety of materials) and AP-2 (inattentiveness) are again negative predictors. But WD-1 (time-spent preparing and teaching) and AP-1 (pupil productivity) appear as negative predictors.

AP-1 as a negative correlated is interesting since it is an indicator that pupils can answer questions correctly or that they are

performing assigned work accurately. We would expect such a measure to be positively correlated with scores, as it was in the second-grade reading analyses. AP-1 has three components, observed good reading performance in oral reading, in phonics skills and in reading comprehension. Phonics skill (sounding out new words or knowing the sound connected with letters) as a single score correlates positively with decoding scores at the second grade but negatively with reading comprehension and application scores at the fifth grade. Evidence of oral reading skill, however, was a positive predictor of comprehension and application scores at the fifth grade level only. Pupil productivity (AP-1) at the fifth grade may be mainly evidence of phonic skills. If the teacher is calling for decoding skills in his or her questioning, he or she may be emphasizing decoding skills rather than comprehension skills. Thus AP-1 may be a proxy for what the teacher is emphasizing.

Since AP-1 appears only once in these analyses as a negative predictor it may have a negative sign because of its relation with other variables. It has a substantial correlation with AP-6 (teacher-group) and with WD-1 (time-spent preparing and teaching) which is also a negative predictor. Perhaps WD-1 and AP-1 are indicators of the ineffective use of group instruction. That is, teachers who use groups spend more time in this instructional mode, but spend it questioning students about the reading rather than explaining, discussing and using questioning strategies that comprise a dialogue about the materials. Recall that R-4, directed seatwork, is a positive

predictor, but instructing in a group is not positively related to pupil scores.

Also, a critical factor is what the teacher does while the students are reading individually. R-4 as a positive predictor indicates that there are teachers who work with the children on what they are reading. But an analysis of the teaching performances of the teachers whose classes fall into the three groups defined by the pattern scores reveals that teachers in whose classes gains are more evenly distributed use groups more frequently. But teachers in whose classes gains occur at the high end of initial scores do more individual instruction. Thus, the balance between individual instruction and group instruction is probably critical as well as the specific character of that instruction.

An important area of future study should be the character of group instruction. One form of such instruction is to ask questions about the content of the reading which determine only if the children have grasped the basic facts. Another style would involve a discussion of the substance with the emphasis on the more complex aspects of comprehension. These styles in relation to the balance between group and individual instruction should be an area of future research.

In the stepwise regression of mean gain scores on teacher performances using the discriminant (smaller) group, no positive predictors were found but two negative predictors appear, AP-8, a measure of the degree to which the teacher spends time organizing and managing instruction and again, AP-2. We need say no more about the possible interpretation of the meaning of AP-2 and its relevance to the learning

of reading. AP-8, time-spent organizing, suggests an hypothesis, that direct instructional time is, again, a critical factor in the teaching of reading in the fifth grade. A teacher who has higher AP-8 scores generally is a teacher who is investing more time in activities that are not direct instruction, even though they may be activities related to enabling students to become involved in the reading tasks. The teacher who spends 15 minutes of a class period explaining the nature of the reading task is a teacher who would have higher scores on AP-8. An appropriate inference is that the more time spent in this kind of an activity, the less time for direct instruction, and when the amount of direct instructional time is reduced, gains are less.

This difference fits with the picture obtained from an analysis of residual scores. In that analysis we found that AP-10, sustained interaction around the reading materials, was a positive predictor of pupil gain, as well as R-4 which is an index of direct instruction on an individual basis. If we put AP-10 and R-4, direct instructional activities which are positive predictors, together with AP-8, which is a negative predictor and a measure of indirect or noninstructional time, a performance pattern emerges in which the more time the teacher spends in interaction around the reading materials and the less time he or she spends in organizing for that activity, the greater the gains in pupil learning. It seems reasonably clear from these data what the nature of instruction should be in reading at the fifth grade. Admittedly we are speculating, but considering that reading in the

fifth grade is largely designed to improve cognition and is not simply the acquisition of skills as it largely is in the early grades, the type of instructional activity must be such that it promotes, stimulates and rewards thinking about the reading materials. When teachers spend time in such activities greater gains are made.

Refer to the right-hand column of Table 10.1. AP-2 (inattentiveness), AP-8 (organizing) and R-3 (diversity of materials) are the most frequently appearing negative predictors. These performances all related to the management of instruction. AP-8 indicates too much organizing of instruction in the sense of giving task directions. AP-2 indicates lack of sufficient control to maintain attention. R-3 indicates an inappropriate use of materials.

R-4 (directed pupil seatwork) is the most frequently appearing positive predictor. Direct instruction of individuals seems to be the most effective way of teaching fifth-grade reading. The use of this performance, however, assumes that the teacher has organized materials so that if there is a diversity, it does not interfere with direct instruction. The use of direct individual instruction also assumes that the teacher maintains task-orientation.

Recall that classes were sorted by patterns of their slopes and intercepts derived from regression analyses by class. Stepwise regression of scores associated with patterns yielded an $R = .64$ ($p \leq .001$). $R^2 = .41$; therefore, teaching performances account for 41 percent of the variance in pattern scores.

In this analysis, R-4 is again a positive predictor, but WD-1 also appears as a positive predictor. We have no simple explanation for the appearance of WD-1. Using residual gain scores, WD-1 is a negative predictor, so time-spent per se is probably a correlate of different instructional styles. But time-spent (WD-1) in direct individual instruction (R-4) may be the combination that produces a differential pattern of gains.

This possibility is suggested by the negative predictor which appeared in this analysis, WD-4, a measure of how varied or complex the organization of instruction was. A teacher could obtain higher WD-4 scores by using individualized instruction plus whole class instruction plus group work. Thus WD-4 as a negative predictor suggests that a variety of instructional models is ineffective. AP-8 as a negative predictor has been discussed previously. It is a measure of the amount of organizing time.

The results for Grade 5 Reading are remarkably consistent. If one were to generate an algorithm for teaching reading at this grade, it would be: assign most if not all of the instructional time to individual reading; discuss this reading with each student, using explanations and questions to stimulate thinking; if groups are organized, use them for discussions of reading; but such group work probably should be used only if a group discussion makes sense; do not use the group as an alternative to direct individual instruction.

Significant Teaching Performances - Grade 2 Mathematics

The stepwise regression of spring scores on teacher performance variables with fall scores partialled out using the total group yielded a R = .67, and R^2 = .45 when six variables were used in the stepwise regression. These six variables account for 45 percent of the variance in spring scores when fall scores are partialled out; four have significant regression weights. In this analysis WD-2, the variety and range of mathematical skills taught, is the only positive predictor. An interesting combination of variables are the negative predictors, WD-4, AP-7 and AP-12. These three variables together represent teaching performance in which the teacher is using a more complex organizational arrangements for teaching, such as teaching individually and in groups but teaches the class-as-a-whole as the principal instructional context; and, uses a pattern of questioning in which the teacher responds to children's questions or work rather than initiating instruction by asking questions, offering explanations or discussing work.

By using this type of analyses, we find that the mathematical knowledge a child brings to the class (fall scores) plus the amount that he or she is taught (WD-2) are the best positive predictors of where the child will be performing by the end of the year. The negative predictors probably describe less effective ways to teach second grade mathematics.

The stepwise regression of mean gain scores on teaching performance

variables for the total group yielded a multiple R = .80; the performance variables, therefore, account for 64 percent of the variance in the mean gain scores, and 15 performance variables are involved in this prediction, of which 11 have significant regression weights. In this analysis four positive predictors appear, R-1 which is a measure of the amount of time spent in instruction and monitoring instruction, WD-2, a measure of the variety of mathematical skills and concepts taught, WD-3, a rating measure of the complexity of the instructional design, and AP-13, a measure of the kind of social control used by the teacher. Again, the amount of content taught (WD-2) appears as a positive predictor. WD-3 is a measure of the teacher's ability to conceptualize a variety of strategies for teaching, although it is not a direct measure of the use of these strategies. It may reflect a teacher's understanding of teaching problems and may be an indirect measure of their diagnostic skills and knowledge of how to teach. AP-13 is a performance in which the teacher directly keeps the child task-oriented, usually by redirecting rather than disciplining a pupil. AP-3, a measure of pupil task-involvement, approached significance; this relation probably reflects the relation of AP-13 to pupil scores. The positive predictors are related to increasing the amount of content in mathematics covered (WD-2), and keeping the students on-task (AP-13). The two measures, R-1 (teaching time), and WD-3 (complex design), are probably proxies either for careful planning of instruction or

for performances in which the teacher quickly assesses when a child is having a problem and does something about it.

The negative predictors are teaching the class-as-a-whole, AP-7; teaching in a group, AP-6; using a variety of instructional contexts, WD-4; WD-5, using a diversity of materials; and AP-9, non-directed, non-systematic questioning and answering. AP-2, inattentive pupil behavior, a concomittant correlate. These variables present a picture of how not to teach mathematics in second grade. Teaching the class as a whole and group instruction are less effective. Introducing a variety of materials and instructional modes probably is confusing. Instructional behavior in which the teacher simply asks questions on the content is also dysfunctional.

It is useful to recall that a common way of teaching mathematics in the second grade proceeds somewhat as follows: the teacher stands before the class, explains a problem, or a concept, or a way of performing a mathematical operation. The children will have either worked on the problem or operation prior to this moment of instruction or are about to. As the teacher explains, he or she asks questions of different students in the class about the material being taught. This method of instruction, which is fairly typical, is dysfunctional.

Mathematics instruction at the second grade is fairly concrete. The students are learning the basic concepts of common arithmetic, and are performing a series of operations which enables them to combine various kinds of numbers. The process of combining numbers requires a series of discrete steps, the retention of what are called basic

facts such as the times tables, and careful checking of the operations performed. The content of second-grade mathematics is more likely to be learned to the degree that the student performs these operations in as many different ways as possible and receives corrective feedback on the operations performed from the teacher or from the instructional materials.

The performance of the operations also are ways of understanding the underlying concepts, such as the union of sets, the basic concept related to the processes of addition. Understanding of the concept is intimately related to the ability to perform the operations; for example, a child may be able to combine groups of things with which he is familiar, such as blocks or objects; but the processes of understanding mathematics require him to move from the phenomenal world to the abstract world of quantities. He must learn how to combine these abstract quantities. A child, for example, may be able to group into one set two separate sets of objects. This combination requires the child to operate in Piaget's terms at the concrete operational level, and many if not most second grade children will be able to perform these concrete operations. But to combine quantities requires an abstraction of the quantity from the objects to which they may be attached. The child, therefore, may learn the basic concepts by manipulating objects at the concrete operational level. But to move beyond that the child must combine quantities as abstract entities in themselves, and probably needs considerable practice in the processes of combining such quantities.

It is reasonable to assume that the learning of mathematics at the second grade is facilitated by considerable experience with these combinatorial operations of abstract quantities, that is, numbers.

In order to acquire both understanding and skill in these operations, the child must practice specific combinations in a variety of forms. It would appear then that the more direct experience that the child has in attempting these operations the more likely he or she is to learn them. It is also reasonable to assume that if the teacher carefully monitors the processes of this experience, the child can receive corrective feedback which will facilitate acquiring skill in combining quantities.

The data suggest that any performance which either interferes with a system in which the child can work on these operations at the specific level required to learn them or is a substitute for a system which encourages the performance of these operations will be negatively related to learning. Teaching the class-as-a-whole (AP-7) is a system which, while it is being used, consumes time that the child might more profitably be spending in direct performance of mathematical operations and application of concepts. Similarly, an interactive mode in which the teacher asks a child a question, and then moves to another child as the teacher seeks a correct answer (AP-9) is a system in which a particular child's attention is not kept focused directly on the processes of the operations until he or she has mastered a particular combination or a concept.

In the analysis to date, we have not used information on the

character of the mathematical materials with which the child works. We know only that a great variety in those materials is likely to be dysfunctional. Since much of the mathematical material provided children in the elementary schools is self-instructional or almost self-instructional, we suspect that the fact that we do not find certain kinds of teaching performances positively correlated with gains in pupil learning may be related to the fact that the materials themselves are providing the equivalent of what a teacher would do if the teacher were instructing the child directly. Thus if a child works through a series of problems which require working out each step in detail and which may provide corrective feedback at each step, he or she may not need much direct supervision by the teacher, except to keep him or her on-task. But if the teacher introduces a lesson which takes the child away from these materials, as when the teacher spends a considerable proportion of the time teaching the class-as-a-whole, then there is likely to be less learning because this procedure is a less effective form of direct instruction.

It is instructive to contrast the results obtained in second grade mathematics with those obtained in the analyses performed with respect to second grade reading. In second grade reading, direct instruction by the teacher to an individual child was an effective teaching performance; we do not obtain a similar result in the analysis of second grade mathematics (R-4 is in fact a negative predictor) but it may be that the materials used in the teaching of second grade mathematics are sufficiently self-instructional that there is relatively little teacher effect to be

added to that which the materials themselves are providing. The materials may be providing the appropriate instructional mode and do not require the teacher to contribute directly to the instruction; or, the amount of contribution required is sufficiently small that it is impossible in the kind of analysis that we performed to detect a directly measurable effect of direct instruction by the teacher.

On the other hand, in second grade reading, the child is learning processes rather than operations and direct instruction is likely to be facilitating because the teacher stimulates the generation of those processes and because the materials themselves are not providing direct instruction on the processes. It is obvious that it would be relatively easy to test the hypotheses implicit in these speculations. There are reading materials which are programmed in much the same way that mathematics materials are programmed, so that one could compare the effects of using these kinds of materials. If the materials are similarly structured, it would be possible to determine the extent to which a teacher effect is added to the effect of the materials themselves.

The stepwise regression of residual scores on teaching performances using the discriminant (smaller) group yielded results similar to those obtained with the larger group. WD-2 (range of content) was a positive predictor; AP-7 (teaching the class-as-a-whole) and WD-4 (varied instructional contexts) were negative predictors. AP-11 (mobility) was added as a positive predictor. This variable is a measure in which the teacher moves around the room as the children are working. It is probably a proxy for other kinds of interaction with the children.

The stepwise regression for the same group using mean gain scores yielded similar results. WD-2 is again a positive predictor, and WD-4, negative. AP-2 (inattentiveness) appears as a negative predictor, and AP-9, unsustained questioning, is also negative.

Refer to the right-hand column of Table 10.1. Among the positive predictors WD-2, range of content to be covered, appears most frequently in these analyses. WD-4, variety of contexts (class, groups, individuals), AP-2, inattentiveness, AP-7, teaching the class-as-a-whole, and AP-9, unsustained questioning, each appears two or more times as a negative predictor.

The optimal instruction strategy appears to be one in which more practice than explanation is used. We suspect that the explanation component should be relatively brief, followed by supervised practice. Either the teacher or the materials should provide direct instruction and feedback. An ineffective strategy involves teaching the class-as-a-whole, failing to maintain on-task behavior, unsystematic questioning, and varying the instructional context.

Recall that classes were sorted by the pattern of mean gains as identified by their slopes and intercepts. When in a stepwise regression pattern scores were regressed on teaching performance, $R = .61$, $R^2 = .37$. Thus the teaching performances account for 37 percent of the variance in pattern scores. Four variables, all with significant regression weights, yielded this result.

Three of these, R-4, WD-3 and AP-11 were positive predictors. R-4 is a measure of directed individual instruction, and AP-11 is a

measure of the degree to which the teacher circulates among the children. Thus R-4 and AP-11 define a teaching style which accounts for greater gains across more children. WD-3 is a rating of the teacher's proposed strategies for dealing with teaching activities. It is a proxy for a teacher's understanding of how to cope with teaching problems.

WD-2, range of content to be covered, is a negative predictor. This result seems puzzling because WD-2 was always a positive predictor. But in these other analyses the gain scores were being predicted, not their pattern. In general, the more content a teacher plans to cover and covers, the greater the gains. WD-2 is, however, associated with a pattern of relatively less gains for pupils in a class, and gains made are made largely by children whose initial scores were higher. The consequence of covering more content is that the children with more knowledge learn more. To produce greater gains for children with lower levels of skill development, perhaps less content should be covered. What is needed is an optimizing strategy. More content is provided for those who already know more without creating a deficit for those who know less.

An obvious area for future study is how much content is covered with respect to the levels of knowledge of the children. But the behavioral strategy for maximizing gains across all students is to provide directed instruction individually (R-4). Teachers who use this teaching performance more produce gains across a broader spectrum of children.

Significant Teaching Performance - Grade 5 Mathematics

The stepwise regression of residual scores on teaching performances using the total group yielded at step nine a multiple $R = .72$ and $R^2 = .51$. The nine teaching performance variables account for 51 percent of the variance in spring scores when fall scores are partialled out. All of these variables, except one, have significant regression weights, and therefore we are reasonably confident that this analysis yields a prediction equation from which we may draw conclusions about effective teaching performances.

There are five positive predictors, WD-4, varied organizational arrangements, AP-6 amount of time spent by the teacher teaching a group, AP-7, amount of time spent by the teacher teaching the class-as-a-whole and AP-13, a teaching performance that is a form of social control directed to keeping the children on-task. AP-10, interactive teaching activities in which the teacher explains, discusses and questions is also a positive predictor although its regression weight was not significant.

Two modes of instruction appear effective at the fifth grade which were not effective at the second grade. Apparently in teaching fifth grade mathematics the teacher may teach the class-as-a-whole or teach in groups. Several reasons may account for these differences by grade level. Presumably by the fifth grade the child has mastered or been familiarized with the basic mathematical operations. The emphasis in fifth grade mathematics is on concepts and problems and the operation being learned are variants on operations previously

learned in the earlier grades; for example, if children are learning ratios or percentages, the emphasis is on the concept, and the child has already mastered the operation of division which is the operation involved in such quantities as ratios and percentages. Because the child has also had more experience with instruction, it may be that the child is able to learn more easily in a group context at this grade level.

WD-5, a variety of materials, is a negative predictor. Throughout these analyses a variety of materials in mathematics has consistently appeared as a negative predictor of learning. There were four negative predictors two of which have highly significant regression weights. These two are AP-2, a measure of students' inattentiveness, and WD-5, variety of materials. Again, it appears that a necessary condition for learning mathematics is maintaining task-involvement. We interpret the appearance of variety of materials as a negative predictor to be a proxy for unstructured content. It may be that when teachers use a variety of materials the child literally jumps from one kind of task to another without seeing the connection between the tasks or the relevance of one task to another.

AP-1, pupil productivity, and AP-3, attentiveness, appear as negative predictors which is interesting. They are both correlated with AP-6 ($\underline{r}$ = .21 and .31 respectively), and AP-3 is correlated with AP-7 ($\underline{R}$ = .31). One may be more likely to observe more correct answers and attention in these contexts because teachers are questioning in these contexts. Because of these positive correlations among these variables, AP-1 and AP-3 may appear negative in a stepwise regression

because AP-6 and AP-7 are positive. Or they may be negative because the teachers are calling on children who know the answer.

The stepwise regression of mean gain scores on teaching performances for the total group yielded an R = .79, with R^2 = .62. Thus 10 teaching performance variables account for 62 percent of the variance in mean gain scores.

The combination WD-4 (variety of instructional contexts), AP-6 (teacher-group) and AP-7 (class-as-a-whole) are positive predictors. R-2 (skill acquisition and practice) is also a positive predictor, as is AP-13 (social control). AP-10 appears in this analysis as a positive predictor. AP-10 is a teaching performance in which the teacher discusses, explains, and questions. It is sustained and focused interaction.

Three variables that appeared as negative predictors in the analysis of residual scores also appear in this analysis, AP-1, AP-2 and AP-3. We think that AP-2 is a negative predictor because sustaining attention while teaching the class-as-a-whole is probably difficult. The typical style of the fifth grade teachers is AP-6 and AP-7. Some teachers can maintain on-task behavior in these contexts, and some cannot. When AP-2 is high, learning is less. But AP-6 (teacher-group) and AP-7 (teacher-class) are effective contexts for instruction in fifth grade mathematics, while direct individual instruction (R-4) is not.

When we find that direct individual instruction is not effective, we must assume that teachers characterized by this style (high R-4 scores) are failing to do something that would make the direct

instruction of an individual effective. There are several possibilities: (1) they may not maintain the involvement of the other children while instructing one; (2) they may instruct poorly; and, (3) they may be instructing selectively. Also when AP-6 and AP-7 appear as positive predictors it is safe to assume that teachers who use such contexts do so in a way to reproduce the best features of direct individual instruction.

When residual scores were regressed on teaching performances using the discriminant group, $R = .70$ and $R^2 = .49$; thus the teaching performances account for 49 percent of the variance in residual scores.

In this analysis AP-6 (teacher-group) and AP-7 (teacher-class) do not appear as positive predictors, but WD-4 (varied contexts) does. AP-10, a type of teaching activity (discussing, explaining, questioning) is a positive predictor as in AP-13 (social control-redirecting behavior).

AP-2, inattentive pupil behavior, is again a negative predictor, as is R-3, diversity of materials. R-3 (time-spent using a variety of materials) is probably a proxy for R-4 (direct individual instruction) which in the previous analyses was a negative predictor ($\underline{r} = .70$). WD-1, preparation and teaching time, is negatively correlated with AP-7 ($\underline{r} = .25$) so it also may be a proxy for a form of individual instruction, or since its correlation with WD-4, a positive predictor, is substantial ($\underline{r} = .39$), it may turn up negative in a stepwise regression.

When mean gain scores were regressed on teaching performances using the scores of the discriminant group, $R = .65$ and $R^2 = .42$. Thus, teaching performances account for 42 percent of the variance in mean gain scores.

WD-4 (varied contexts), AP-6 (teacher-group) and AP-13 (social control-redirecting behaviors) are again positive predictors. WD-1 (time spent), AP-1 (pupil productivity) and AP-2 (inattentiveness) are again negative predictors. We offered explanations for these relations in the preceding paragraphs.

Across all analyses of fifth-grade instruction in mathematics, the most frequently appearing positive predictors were WD-4 (varied contexts), AP-6 (teacher-group), AP-7 (teacher-class), AP-10 (sustained interaction) and AP-13 (social control). These variables were significant two or more times. These variables define effective teaching contexts (AP-6, AP-7) and styles (AP-10 and AP-13).

Across all analyses, WD-1 (time-spent), AP-1 (pupil productivity), AP-2 (inattentiveness), and AP-3 (attentiveness) are the most frequently appearing negative predictors. AP-2, which was significant in four analyses, is obviously a critical factor. AP-3 and AP-1 may be appearing as negative because of their positive correlations with AP-6. Similarly WD-1 is positively correlated with WD-4, a positive predictor. AP-1 is correlated with R-3 (diversity of materials), AP-6 (teacher-group) and AP-9 (checking) and we suspect that it is a proxy for a kind of independent group work in which the children work in groups on comparable materials, and the teacher monitors this work. This organization may be ineffective because the amount of direct instruction is less.

Recall again that classes received scores based on the pattern of the slopes and intercepts obtained in the regression analysis by class. When mean gain scores were regressed on these pattern scores, R = .60

($p \leq .02$) and $R^2 = .36$; thus teaching performances are accounting for 36 percent of the variance in scores which describe the pattern of mean gains.

In this analysis, WD-4 is the only positive predictor. WD-4 measures how much the teacher varies the instructional context. We have seen in the other analyses that AP-6 and AP-7 were positive predictors. A teacher scoring high on WD-4 varies the context, teaching the class in groups or the whole class simultaneously and also provides some individual direct instruction. Teachers who vary instructional contexts produce a different pattern of mean gains, one in which the gains are spread across most or all of the students.

The absence of other positive predictors should be noted. Simply varying the context of instruction is not likely to be the major determinant of how much children learn. We have seen in other analyses, at the second grade for example, that teaching the class simultaneously or in groups was not effective. We have proposed that grouping is likely to be effective when the teacher creates an analogue of direct individual instruction; these systems are likely to be effective when attention is maintained, the form of interaction is sustained through discussion, or explanation, or systematic questioning. In the analyses for fifth-grade mathematics, such variables were found to be positive predictors (AP-10 and AP-13). In this analysis we find that it is the variation of the contexts that produces a spread of gains across students, but the teachers must also be providing the other conditions of effective instruction.

This explanation is consistent with the picture that appears in the negative predictors that were found significant in this analysis. R-1 (teaching time), AP-8 (organizing) and WD-5 (diversity of materials) are all negative predictors. A teacher who has high scores on these three variables is trying to teach in the different instructional contexts and is using a variety of materials, but spends more time organizing instruction than providing direct instruction. Under such conditions, the children who learn most are those who originally knew the most.

Of particular interest in the fifth-grade analyses is the appearance of the organization-of-instruction variables, WD-4, AP-6 and AP-7 as positive predictors of learning gains. Individual instruction alone (R-4) is ineffective. It may be that it is easier to control the task-orientation of older children by using these procedures. Or, instructional materials for the fifth grade may not be sufficiently self-instructional; so that if the teacher uses independent work, the teacher must provide additional components of instruction, for example, corrective feedback. If such is the case, then teachers will find it difficult to provide these for all students.

Another possibility is that the concepts taught at the fifth grade are better learned if the teacher spends more time explaining and discussing these concepts with the children. If such is the case, then grouping the children is an efficient way of providing this kind of instruction.

Summary of the Effects of Teaching Performance on Children's Learning

In this section we will call attention to the main results of the analyses presented in the preceding sections. The first aspect of these results to note is that teacher effects were found in every in every analysis. Table 10.2 presents the values of R and R^2 for each analysis. Results are similar for both groups, the total group and the discriminant group. Teaching performances account for a substantial portion of the variance in all cases.

Table 10.3 summarizes the variables found significant in the regression analyses by the major categories into which the variables may be divided. Instructional time, measured by WD-1 and R-1, is a measure of the time that the teacher spends preparing and conducting instruction himself or herself. The measure is independent of the actual amount of time the children spend reading, and it is also independent of the role the teacher plays while teaching. It does not include the amount of time children spend working independently.

Consider some examples. If a teacher organizes the class into groups, and spends a portion of the reading period with each group, time teaching in each group is an example of time spent teaching. But if the teacher sets the children to working by themselves while the teacher works at this or her desk, or walks around the room without interacting with the children, time in this activity is not credited to time spent teaching.

These variables are usually negative predictors of learning. The reason is that they in themselves do not discriminate how the

TABLE 10.2

Summary of R, R^2 and Percent Variance Accounted for in Stepwise Regressions of Residual, Mean Gain and Pattern Scores on Teaching Performance

	TOTAL GROUP			DISCRIMINANT GROUP		
Reading						
Grade 2	(N = 40)			(N = 33)		
Residual Scores	.59	.35	35	.68	.46	46
Mean Gain Scores	N.S.	---	--	.77	.59	59
Pattern Scores	---	---	--	.96	.92	92
Grade 5	(N = 53)			(N = 41)		
Residual Scores	.56	.31	31	.59	.35	35
Mean Gain Scores	.33	.11	11	.39	.15	15
Pattern Scores	---	---	--	.64	.41	41
Mathematics						
Grade 2	(N = 41)			(N = 37)		
Residual Scores	.67	.46	46	.67	.45	45
Mean Gain Scores	.80	.64	64	.58	.34	34
Pattern Scores	---	---	--	.61	.37	37
Grade 5	(N = 54)			(N = 45)		
Residual Scores	.72	.51	51	.70	.49	49
Mean Gain Scores	.79	.62	62	.65	.42	42
Pattern Scores	---	---	--	.60	.36	36

TABLE 10.3

Significant Teaching Performances and Pupil Behaviors Organized by Functional Similarity: Stepwise Regression Analyses of the Total and Discriminant Groups of Teachers

Category	Function	Measures	Significant Activities: Reading Grade 2	Reading Grade 5	Mathematics Grade 2	Mathematics Grade 5
Instructional Time	Time spent by teacher in direct instruction, preparing, managing class.	WD-1, R-1	WD-1(-)	WD-1(-)	R-1(+)	WD-1(-)
Instructional Content	Concepts, Facts, Skills Introduced; Reviewing; Practicing.	WD-2, WD-3, R-2	R-2(-)		WD-2(+) WD-3(+)	R-2(+)
Instructional Material	Variety of instructional materials.	WD-5, R-3	WD-5(+) R-3(+)	WD-5(-) R-3(-)	WD-5(-)	WD-5(-) R-3(-)
Instructional Organization	Grouping of students-individual, small group, class; complexity of the classroom organization.	WD-4, AP-5, AP-6, AP-7	WD-4(-)		WD-4(-) AP-6(-) AP-7(-)	WD-4(+) AP-6(+) AP-7(+)
Instructional Activity	Organizing, explaining, discussing, supervised seatwork, demonstration.	R-4, AP-8, AP-9, AP-10, AP-11		R-4(+) AP-10(+) AP-8 (-)	R-4(-) AP-9(-) AP-11(+)	R-4(-) AP-10(+)
Teacher-pupil Interaction	Responses of teacher to student; praise; feedback; disciplining; ignoring.	AP-12, AP-13 AP-14	AP-12(-)		AP-12(-) AP-13(+)	AP-13(+)
Pupil Behavior	Content and task-oriented behavior; task involvement.	AP-1, AP-2, AP-3	AP-1(+)	AP-1(-) AP-2(-)	AP-2(-)	AP-1(-) AP-2(-) AP-3(-)

teacher is spending the time. In some cases, they correlated negatively with instructional contexts which are also negative predictors.

Instructional content is measured by WD-2, WD-3, and R-2, which are measures of what the teacher said was covered in the preceding week or was observed to be covered during the class period. Such variables are positive predictors in mathematics at both grade levels. R-2 is a negative predictor at grade 2 for reading. R-2 is correlated substantially with R-3, a positive predictor, and may be showing up negative because of the technicalities of stepwise regressions.

Or, teachers who are trying to cover more content in reading may be disorganizing the learning process. Second-grade reading requires learning a number of relatively independent skills and then integrating these skills into patterns of decoding skills. At any particular point in time the teacher must be clear about the specific learning to be acquired. If he or she does not focus on a particular skill until it is learned, the children will have difficulty integrating this skill into more complex patterns. R-2 may be an indicator of improperly sequenced and poorly integrated learning tasks.

Instructional materials is a category describing the variety of materials that are used by the teacher. It does not describe their character. Only in second-grade reading is diversity a positive predictor. At all other levels in both reading and mathematics, diversity of materials is a negative predictor.

There is a common belief that diversity of materials is beneficial. But common sense suggests that the nature of the materials themselves

and how they are used are also likely to be important factors. Again, we emphasize that these variables must be put together into patterns to interpret them most intelligently. But it is worth considering why these results with the diversity of materials variable might in themselves be significant.

In second grade reading instruction where both diversity variables (R-3 and WD-5) were positive predictors, the children are learning discrete skills and integrations of them. A substantial portion of this work is learning both auditory and visual perceptual discriminations. The responses being acquired are recognition responses. Different materials may be useful because the materials can be adapted to each child's level of skill. They may be useful because the materials present the responses to be learned in different ways, or they may provide practice across a greater variety of reading materials. The children are learning discrimination responses and the more opportunity they have to practice these responses in a variety of auditory and visual contexts, the greater will be their learning.

The children are also learning basic cognitive processes--how to classify and group (concepts), and how to find regularities (rules and generalizations). Again, the more contexts in which these responses are practiced, the greater will be the learning. A diversity of materials may be an indicator of greater opportunities for the children to practice the perceptual and cognitive skills that are to be learned.

At fifth grade, however, the emphasis in reading is usually on comprehension. The reading materials require extended reading and

thinking. A diversity of materials may interfere with learning if the children do not have sufficient time to explore the material in depth, if the emphasis is on having read the material but without in-depth exploration of it, or if the availability of this diversity reduces the facility with which the teacher can discuss, explain, and question the children about the substance of their reading.

In mathematics, a diversity of materials is consistently a negative predictor. There may be an interaction between the materials and the nature of the instruction being provided by the teacher; for example, to the degree that the materials go beyond what the teacher has presented or explained, the children are required to transfer what they learned from the teacher to the new content, a transfer task that is best facilitated by direct help on the transfer problem. A teacher who explains a concept or process at its basic level, and then puts the children to work on tasks that go beyond what she or he has presented may be ignoring the difficulties the children will have in making the transition.

Another possibility is that at the second grade discrete processes are being learned which are best learned by practicing the operations involved in a systematic way. The materials may be introducing other content, perhaps to make the lesson more interesting. If this material is not closely linked to the basic concepts and operations to be learned, the children have less time for mastering these basics and may find it difficult to relate the additional material to the basic concepts and processes.

These speculative explanations apply also to fifth grade mathematics. By the fifth grade, presumably the children are familiar with the basic concepts and operations and in some cases have mastered them. They are extending their knowledge of mathematical concepts and using the operations they have learned in this new learning. Such learning requires in-depth explanation by the teacher and practice and application by the children. The task at any given moment in time is focused in character. If the children are learning percentages, for example, they must acquire the concept of a proportion, learn its quantitative representations, and apply the operations of multiplication and division to calculating percentages. Covering more content than that relevant to this task is likely to be distracting or confusing. It should be obvious that either the character of the materials used in teaching mathematics or how these materials are organized is a problem area.

The Instructional Organization category describes how pupils are grouped for instruction as well as the variety of groupings used by teachers during instruction. A variety of instructional contexts (WD-4) was a negative predictor for both second-grade reading and mathematics. WD-4 was the only context variable that related to reading instruction, and then only for second grade.

The significant predictors for mathematics are interesting. The three variables that are negative predictors for second grade are positive predictors for fifth grade. WD-4, variety of instructional contexts, AP-6, teacher-directed group work, and AP-7, teacher-directed class work, are effective or ineffective contexts depending

on the grade. Teaching the entire class simultaneously, teaching groups of pupils, or varying instructional contexts are effective for fifth grade instruction but not for second grade.

Instructional activity includes complex teaching performances. These are actions which are sustained over time; for example, AP-10 includes the discussing, explaining and questioning behaviors of the teacher which occur systematically and persist over minutes. AP-9 is a briefer interaction--a quick question, a brief comment, a short explanation and then the teacher moves to another child.

None of these variables appear as positive predictors for second grade reading. Second grade reading appears to be heavily dependent on the materials of instruction (a positive predictor), where explanations might tend to be brief; discussion in depth are less relevant. The learning is mostly discrimination learning.

Although R-4 (direct individual instruction) was not a positive predictor, it is substantially correlated with R-3 (diversity of materials) and R-1 (teacher as main instructor). We suspect that R-3 is a proxy for this combination of variables. The combination is individual direct instruction by the teacher on the materials at hand. As long as the teacher is providing this instruction, and giving the instructions that are likely to be brief because of the nature of what is being learned, it is not altogether surprising that the teaching activity variables do not show up as positive predictors.

Serious consideration must be given to the nature of the reading or other instructional materials in second grade reading which may be

carrying the burden of instruction. Managing the instruction, providing direct help on the materials, keeping the children on-task, and providing corrective feedback may be the critical components in second grade reading. The reader will recall that these variables accounted for the differences in the patterns of mean gains.

At fifth grade in reading instruction, AP-10, sustained dialogue with the children, is a positive predictor as is direct individual instruction (R-4). Time spent in organizing (AP-8), which takes from the time of instruction, is a negative predictor. At this level the children need to learn what cognitive processes to use to comprehend the reading material. The teacher must model these processes and stimulate them; therefore, teaching performances such as AP-10 are effective while performances such as AP-8 which take time away from direct instruction of this character are ineffective.

In mathematics at the second grade the briefer teaching activities such as AP-9 (checking, questioning) are negative predictors. R-4, which is direct individual instruction, probably appears as a negative predictor because of its substantial positive correlation with R-3 (also a negative predictor). R-1, R-3, and R-4, a combination in which the teacher works individually on the reading materials with each child, is probably an ineffective way of teaching fifth grade reading. We have suggested that what is needed at this grade is sustained interaction with the learner. Thus a style that is effective in the second grade is ineffective at the fifth grade because the nature of the reading task is different.

In second grade mathematics, AP-11 is an indicator of the degree to which the teacher is supervising individual pupils. R-4 appears as a negative predictor, but its sign may be a function of R-4's substantial positive correlation with R-3 which is also a negative predictor.

In fifth grade mathematics, keeping children on-task (AP-13) and sustained interactions with them (AP-10) are positive predictors, whereas direct individual instruction (R-4) is not because it is a component in a style which is not effective at this grade level for reasons which we have previously discussed.

Teacher-pupil interaction describes teaching performances that occur as the teacher interacts with, or more specifically reacts to individual children. AP-12 is a reactive performance; that is, the teacher reacts when the child initiates the interaction. It is an ineffective teaching performance which is not surprising. A teacher who acts characteristically in this way is placing the burden on the child for identifying his or her problems and for asking for help. AP-12 appears as a negative predictor in reading and mathematics. AP-13, a measure of indirect social control, appears as a positive predictor at fifth grade in reading and mathematics. Recall that we said that reading in the fifth grade is a sustained activity. Teachers who maintain children on-tasks have classes which make greater gains.

The Pupil Behavior category includes measures of the children's attentiveness and productivity. The significant variable to note in this category is AP-2 (inattentiveness) which is always a negative

predictor. AP-1 (pupil productivity) and AP-3 which appear as negative predictors (with one exception) are functionally related to the organizational characteristics of the instruction. AP-1, for example, is likely to be higher when the teacher is using groups. If this mode of instruction is ineffective, AP-6 is likely to be associated with ineffectiveness. In other cases, AP-3 and AP-1 are correlated with other variables which are positive predictors, and which, when entered into a stepwise regression first, result in negative signs for AP-3 and AP-1. These variables as measured in this study are most meaningful when considered in contexts of instruction. A more sensitive measure of engagement and understanding, however, is needed before these categories of pupil behavior are likely to be found related directly to learning gains.

The analysis presented above is a way of exploring domains of variables likely to be productive in future research. Separating the variables into these categories is useful only for these purposes. It is better, as we have pointed out previously, to consider the patterns that emerge in the stepwise regressions for a particular grade level and subject, as we did in the sections preceding this summary.

With this limitation in mind, instructional content, instructional materials, instructional organization and instructional activity appear to be the major sources for significant relations. Instructional organization and instructional activity produced the largest numbers of significant relations. We suggest that an organization by teaching activity matrix be used as the frame for describing teaching perfor-

mances. Within this frame, instructional materials and instructional content should be considered as variables that may further refine the patterns of teaching performances.

Results across analyses

As we have pointed out, we performed multiple as well as stepwise regressions on the data. One way to reduce the results of all of these analyses to a meaningful subset is to describe those variables which appear significant across all these analyses. Any variable that appears significant in a variety of analyses must be taken seriously.

Table 10.4 presents the list of these common predictors. It also indicates which variables appeared significant in the multiple-regression analyses. Recall that analyses of the correlation of a single variable with gain scores usually produced few results. We think that this type of analysis is, in any case, misleading. When residual scores are regressed against a single teaching performance, for example, the analysis treats all other performance scores as part of the residual error. But any one variable is usually correlated with one or more other teaching performance variables. While the analysis may reveal the strength of the relation of a single variable, it does so by assuming what is probably not true, that the variable is uncorrelated with other variables or that such correlations are the product of errors of measurement.

The results presented in Table 10.4 should be sufficiently familiar that they will not require extensive elaboration since our

TABLE 10.4

Comparison of the Significant Teaching Performances on Stepwise and Multiple Regression Analyses

Grade 2 Reading

Common Predictors: Multiple and Stepwise Regression

R-3(+) variety of materials
AP-12(+) (-) non-sustained reactive instruction
WD-1(-) time spent preparation/direct teaching
WD-4(-) complexity of classroom structure

Multiple Regression Predictors Only

AP-6(+) teacher led group instruction

Grade 5 Reading

Common Predictors: Multiple and Stepwise Regression

WD-1(-) time spent preparation/direct teaching
R-3(-) variety of materials
AP-2(-) neutral or negative pupil behavior
AP-8(-) organizing and supervising instruction

No Multiple Regression Predictors Only

Grade 2 Mathematics

Common Predictors: Multiple and Stepwise Regression

WD-4(-) complexity of classroom structure
AP-7(-) teacher directing class activities

Multiple Regression Predictors Only

R-2(-) variety of instructional aims
R-3(-) variety of materials

Grade 5 Mathematics

Common Predictors: Multiple and Stepwise Regression

WD-4(+) complexity of classroom structure
AP-7(+) teacher directing class activities
AP-2(-) neutral or negative pupil behavior

Multiple Regression Predictors Only

AP-5(-) independent pupil seatwork

hypothetical explanations for these correlations would be as we have presented them previously. We will therefore call attention to certain variables without elaborated discussion and analysis.

Grade 2 - Reading: R-3 (diversity of materials) appears here again as a positive predictor. Recall that we thought of R-3 as a proxy for direct individual instruction because of its positive correlations with other variables. Noteworthy is the appearance of AP-6 (teacher-group) as a positive predictor in multiple regression analyses. We think it worthwhile to pursue the relation of grouping to direct individual instruction. Group teaching may be effective under a limited set of conditions; but the practice is so universally used that it is probably combinations of grouping patterns with direct individual instruction that should be studied

Grade 5 - Reading: The common predictors here are all negative. They may begin to describe what not to do. AP-8 (organizing) is time spent at the expense of direct instruction. AP-2 is a measure of off-task behavior; when scores on this variable are high, the positive effects of other teaching performances are probably inhibited. R-3 (diversity of materials) is obviously a problem at this grade level.

Grade 2 - Mathematics: The significant teaching performances make sense in the context of the results of the stepwise regressions. Teaching the class-as-a-whole (AP-7) is a negative predictor (direct individual instruction was a positive predictor in the results presented earlier). Skill practice time (R-2) and a variety of materials (R-3) are also consistent negative predictors. We have suggested that

focused teaching is probably the strategy to be used in teaching mathematics; a lot of time spent acquiring and practicing skills with a variety of materials probably interferes with conducting a focused strategy.

Grade 5 - Mathematics: Teaching the class-as-a-whole (AP-7) is a consistent positive predictor. It obviously is an effective organizational strategy in teaching mathematics at the fifth grade; whereas, AP-5, independent seatwork probably is not.

It is worth noting what appears and does not appear in this irreducible list of significant variables. An organizational variable, AP-7, appears in mathematics at both grade levels; positive at grade 5 but negative at grade 2. Inattentiveness (AP-2) appears as a negative predictor at the fifth grade in both reading and mathematics. Thus, how instruction is organized appears to be a domain in which particular patterns ought to be tested for their relative effectiveness. But instructional contexts should be studied in three other respects: (1) how materials supplement or compliment instruction provided by the teacher in a particular context; (2) when materials are used as a substitute for direct instruction by the teacher; and (3) when materials interfere with managing an instructional context.

The absence of teaching activities and specific interactions from this irreducible list is noteworthy. But it should not be concluded that variables in these domains are unimportant. We think that the results presented earlier clearly indicate that some teaching performances are critical. But contexts and materials control to some degree

the pattern of interactions that are likely to occur. What we think we are seeing in these data is the determining influence of the teaching context variables and to some extent how materials determine how a teacher interacts with children. This irreducible list is also more a list of what to avoid, and probably should be regarded as such.

Some Rules of Thumb: If one were to put together the results obtained in these various analyses, what might be said about what to do and what not to do in teaching reading and mathematics? Below are some suggestions which should be treated as hypotheses:

1. Maintaining on-task behavior is critical particularly at the fifth grade. Some forms of organizing instruction, such as teaching in a group, lend themselves to increasing attentiveness because the teacher can exercise more direct control over pupil behavior. But at the second grade, while teaching in the group may lead to greater attentiveness, it may be an ineffective teaching procedure. The problem for the second-grade teacher is to maintain attentiveness while also providing a maximum amount of direct individual instruction.

2. Using a variety of materials is effective only in teaching second grade reading probably because of the nature of what is being learned. In other cases the materials either are inadequate substitutes for direct instruction, or they increase the complexity of the learning task, or they interfere with the management of instruction.

3. The variables that appear to be critical for teaching second grade reading are providing as much direct individual instruction as possible while the child is working on materials appropriate to his or her level of skill.

4. Direct individual instruction is also a critical variable for teaching second grade mathematics but a diversity of materials probably should not be used. Focused teaching and attention to the problems of transfer of learning may be the underlying critical variables.

5. Sustained interaction with children on reading materials and direct individual instruction are probably critical in teaching fifth grade reading.

6. Teaching in a group or teaching the class-as-a-whole are effective ways to organize instruction for teaching fifth grade mathematics. But such organizations assume that the teacher maintains sustained interactions with the children in these contexts, explaining, discussing and questioning around the content.

7. Indirect forms of social control such as redirecting a child's attention appear to be the most effective ways of maintaining productivity and on-task behavior.

8. Interactive teaching performances which are brief or reactive in character are usually ineffective.

There is a theme in these "rules-of-thumb": If an organizational context or a teaching performance provides for direct instruction, learning will be improved. Thus, the problem for research is to study teaching performances as mediators of variables that characterize a

model of direct instruction. The critical problem is not whether a teacher teaches in a group or not. It is whether such teaching is an instance of direct instruction. When a particular teaching performance is found to be ineffective, as were teaching groups or the class-as-a-whole in mathematics at grade 2, it should be examined to find out what is missing from the model of direct instruction.

Direct instruction has the following components: (1) a component which explains what is to be learned, or models it, or elicits its elements by questioning; (2) a component which provides the appropriate conditions for attempting what is to be learned; and (3) a component which provides feedback on how well the child is learning what is to be learned. These components are most effectively mediated in direct, individual interaction with the child. Substitutes or alternatives for this direct, individual interaction which mediates these components must provide for these variables in another way. Independent seatwork (AP-5) is ineffective when the teacher does not provide sufficient feedback, or reduces the amount of explanation or elicitation of relevant response. Materials are effective when they provide the components, that is, when they are truly self-instructional.

As a final comment on these results it is important to emphasize that the data describe characteristic styles or predominant modes of teaching. We believe that the results of this study suggest which styles or components of styles are likely to be effective or ineffective. It is these combinations of teaching performances rather than any single performance that account for the effectiveness of instruction.

Ineffectiveness, in contrast, may be defined by persistent use of certain teaching performances, which are typically negatively related to learning; for example, spending more time organizing for instruction than instructing, or permitting a low level of attentiveness, or using certain organizational contexts that are poor vehicles for instructing at a particular grade level or in a particular subject. Obviously there are also some performances which are neither effective nor ineffective as far as can be determined from this study.

Variables Influencing Teaching Performance

In this study we developed a structural model of hypothesized relations among the domains of variables on which data were gathered. This model was the basis for exploring the relations among variables related to teacher characteristics, aptitudes, knowledge and attitudes and teaching performance as well as the relations among institutional or school characteristics and teaching performance. Path analysis was the statistical technique used to estimate the magnitude and sign of these relations.

This procedure is an appropriate technique for two reasons. The analysis uses all the data and takes into account all the correlations among variables. The model, however, is only one of several that might have been constructed. The structural model we developed represents the questions of primary interest in Phase II of the Beginning Teacher Evaluation Study.

These questior were:

1. What is the relation of teaching performance to children's learning? This question has been discussed in the results presented previously. In the path analysis teaching performances were related to pupil behavior which in turn was related to learning. The hypothesis tested was that teaching performances affected pupil behavior which affected learning.

2. What is the relation of teachers' aptitudes to teaching performance? This question was asked to provide data relevant to formulating policy alternatives for teacher certification. If aptitudes are highly related to teaching performances, particularly to those that have been shown to be effective, two policy alternatives need to be considered after additional study of these variables: (1) policies relevant to selecting teacher trainees; and (2) policies relevant to the training of teachers. Obviously the data in this study are not sufficient to formulate such policies, but they are sufficient to indicate which policy alternatives should be considered and what additional data will be needed to formulate the policies.

3. What school or institutional factors affect teaching performance? School staffs are organized in different ways. Some schools are ungraded; team teaching is used in some schools, others use single-teacher classes. Aides are present or not, and when present are used in a variety of ways. Also such factors as the principal-teacher relations may determine how teachers teach.

This study gathered data on domains of variables related to these questions. The structural model was a way of describing these questions formally and path analysis was a way of testing the hypotheses which comprised the model. In the following paragraphs we present the major results of this analysis.

Three conclusions apply across levels and subject:

1. The pupil productivity category was a relatively poor predictor of learning. It should be remembered that this variable was measured by observing the activities of children in class. Measures of pupil productivity reflected the teaching context, so that teachers, for example, who used groups more frequently, generally had higher pupil productivity or attentiveness scores. The pupil productivity scores appear to be proxies for other variables, such as context variables which we found to be differentially effective by grade level and subject.

Inattentiveness (AP-2), however, was frequently a negative predictor of pupil learning. The teaching performances that affect this variable vary by grade level and subject. In second grade reading, the use of a variety of materials where the teacher provided much of the direct instruction is a pattern associated with higher inattentiveness. Independent pupil seatwork and a variety of instructional content during the period was the pattern associated with inattentiveness in grade 2 mathematics. At the fifth grade, independent pupil seatwork with brief teacher interactions with the children was associated with inattentiveness in reading; whereas direct individual instruction was

associated with lower inattentiveness. Similarly, direct instruction was associated with attentiveness in mathematics and independent seatwork with inattentiveness in mathematics.

Teaching performances are directly related to the amount of attentiveness during the period, and inattentiveness is usually related to less learning. In general, a teaching performance that involves direct interaction with children is associated with greater attentiveness provided that, if the interaction is with an individual child or with a group, the teacher is also maintaining the attending behavior of other children in the class.

2. The teacher-aptitude domain produced, at both grade levels and for both reading and mathematics, the largest number of significant path coefficients. Teaching performance may be a direct function of teacher aptitude. The method of analysis used in this study supports this hypothesis. The aptitude tests measured perceptual and cognitive processes; therefore, these characteristics of the teacher probably determine how the teacher organizes the teaching world perceptually and cognitively. But we do not know how these organizations affect the decision-making processes which eventuate in certain kinds of performances. An obvious area for future research is to study in greater detail how these aptitudes lead to decisions about teaching. The conclusions about teachers' aptitudes are described in greater detail in the second section of this summary.

3. AP-13, a type of social control, which usually is associated with greater attentiveness, and was in the regression analyses

occasionally a positive predictor of learning, is negatively correlated with cognitive style. This correlation means that field-dependent teachers are more likely to use this particular form of keeping children on-task. Any proposed explanation of the underlying causal mechanisms in this relation would be highly speculative. We suggest only one. Teachers who are more field-independent may be more focused on the teaching task and less susceptible to influence by the individual personality characteristics of the children. This suggestion should not be read to mean that field-independence is a proxy for insensitivity. This characteristic is a matter of degree; AP-13 is a technique, however, which refocuses the child on the task but without direct disciplining. We suspect that it is used by teachers who keep the child focused without creating a psychological disruption.

In the following paragraphs we will present the major conclusions about the different domains predicted to influence teaching performance.

Grade 2 - Reading

Teaming directly affects the amount of grouping that teachers use in instructing; but grouping is marginally effective in teaching second grade reading. Direct invididual instruction is the critical variable here, and if teaching in a group facilitates direct instruction and is a substitute for individual teaching, it is likely to be effective.

Centralization of decision-making in the school is associated with less use of a variety of materials. We do not know if this relation occurs because the principal controls the purchase of the materials or because he or she has set the curriculum. It is also associated with

the amount of time that the teacher directs or carries the instruction himself or herself. This factor appears to predict characteristic teaching styles within schools.

Teachers' attitudes towards their occupation and work were negatively associated with the amount of independent pupil seatwork they provided (an ineffective teaching performance), but were positively related to the amount of teaching in groups that teachers do. We suspect that the attitude measure is a proxy for interest and willingness to expend effort which is reflected in teaching performances in which the teachers engage in direct instruction in contrast to supervising pupil activities.

The knowledge measures were negatively related to teaching performances that placed greater demands on knowledge such as teaching the class-as-a-whole; but were positively related to teaching performances where the teacher presumably has greater control over the knowledge demands placed on him or her, such as teaching-in-a-group. This explanation of the obtained relation is obviously speculative. A conception consistent with the data is that measures of knowledge of the subject and of methodology are antecedents of performance, but probably interact with the perceptual-cognitive processes of the teacher to affect teaching performance. Hypotheses derived from this conception need to be tested.

All of the aptitude factors produce an array of relations (which will be described in a later section). It is clear, however, that there is probably a teacher-aptitude-teacher-performance interaction

at this level. Cognitive style, for example, was negatively related to a variety of teaching performances. This negative relation means that field-dependence is associated with these performances. Such relations are relatively strong indicators of the correspondence between perceptual-cognitive organization of the phenomenal world and how teachers teach. Field-dependent individuals are more sensitive to social relations. Teaching style at the second-grade level in reading is related to this characteristic. Some components of this style, however, are effective, others are not. (It should be remembered that the relation described applies also to the field-independent end of the scales.)

Grade 5 - Reading

Centralization of decision-making is positively associated with teaching-context variables and with an interaction variable, AP-10, which is the type of sustained teacher interaction with children that was effective in teaching fifth grade reading. It seems obvious that how decisions are made in the school is related to characteristic teaching styles. These results may have been produced because the principal is setting standards for teaching, or there is agreement on what are the appropriate performances for teaching reading at the fifth grade or that teachers with characteristic teaching styles have been matched through the selection process with principals who control more of the decisions.

Centralized decision-making may be a proxy for a complex of factors such as well-defined curricular structures, standards for performance,

and a more orderly school. There is probably an interaction between teaching style and administrative style that needs further investigation. The hypothesis tested in this study was that administrative style "causally" influenced teaching performances. That hypothesis was supported by the data.

The components of teachers' attitudes, aspirations and satisfaction, are at this level differentially related to teaching performances. Aspirations appear to be related to interactive performances (positively), whereas satisfactions are related negatively to forms of instruction that are minimally interactive. We suspect that the attitude measure is a proxy for interest and effort variables. The teacher who hopes to accomplish more, instructs more; the teacher who is less satisfied with teaching, instructs less.

Cognitive style relates positively to the context and interactive variables found to be effective at this level in reading. The positive correlation means that field-independence is related to the teaching styles. Recall that in second grade reading, field-dependence was associated with style. Teachers with different characteristics in cognitive style may be concentrated at different grade levels (but there was a spread of scores on the cognitive style measure at both grade levels). What the data mean is that field-dependence predicts teaching performance at grade 2 and field-independence predicts performance at grade 5; thus, there is probably a level by teaching performance by aptitude interaction.

Grade 2 - Mathematics

Centralization of decision-making is directly related to teaching context variables. The pattern here is interesting; the relation is negative with independent seatwork but positive with teaching in groups and teaching the class-as-a-whole which both were negative predictors of learning in second grade mathematics. One suspects that the ineffective teaching styles may be thought of as "better" ways of teaching by the teachers and principal. But it is also interesting to note that AP-6 (teacher-group) and AP-7 (teacher-class) are both associated with lower inattentiveness. Since pupil attending behavior is usually thought of as an indicator of "good" teaching, it may be that in schools characterized by centralized decision-making, the principal rewards order and attention. AP-5, independent seatwork, by itself is usually ineffective, and it is also directly associated with greater pupil inattentiveness. The decision-making variable may be related to rewarding order, but it is obviously not related to effectiveness of instruction.

Teachers' aspirations (attitudes) are negatively associated with independent seatwork and with teaching in groups, but positively associated with teaching the class-as-a-whole. Teachers with higher aspiration scores may think that they are more effective when teaching the whole class; but this context is ineffective at the second grade in mathematics.

At this level, aptitude factors are variously associated with teaching performances. Flexibility is positively related to teaching

the class-as-a-whole. We think that this type of teaching probably does require greater flexibility since the teacher must process a wider variety of perceptual-cognitive information more or less simultaneously. Note that flexibility and aspirations are both associated with this performance variable. Teachers who are more flexible are probably more able to teach the whole class and if they believe that it is a more effective way to teach and want to teach better, then they use this context more frequently. Unfortunately, it is an ineffective procedure for teaching second grade mathematics.

Grade 5 - Mathematics

The availability of aides determines which type of teaching context is used in teaching mathematics at grade 5. With more aides, independent seatwork is used and less teaching of the class-as-a-whole occurs. Unfortunately, teaching the class-as-a-whole was a positive predictor of learning in grade 5 mathematics. But if the aides allow for more direct individual instruction by the teacher (a positive predictor), then we see why R-4, direct individual instruction, was also a positive predictor at this level in mathematics.

Centralization of decision-making is again associated with teaching the class-as-a-whole and with sustained interactions with the children, both effective performances for teaching mathematics at the fifth grade. If the decision-making variable reflects the principal's concern for order and structure, then the concern is rewarding effective teaching performances.

Teachers' aspirations are positively related to teaching the class-as-a-whole. This variable may be an indicator of the teacher who thinks this way of teaching is the way to achieve these aspirations.

Teacher-aptitude factors are less related to context variables but more related to patterns of interaction with the children. We suspect that the teachers are using certain contexts at this level because they believe that that is the way to teach fifth graders. Their aptitudes influence how they interact within these contexts.

Summary of Variables Influencing Teaching Performance

The conclusions reported above are sufficiently consistent to call attention to recurrent themes:

1. The nature of the decision-making processes in the school are predictors of the teaching styles. We have offered several possible explanations for this relation. We recommend that clusters of style by teacher-characteristics variables be defined because we think that such combinations may be useful independent variables. They will also be ways of describing school factors in terms of variables that are more likely to predict differences in teaching styles within schools and in turn differences in learning.

2. There appears to be sufficient data to support the hypothesis that aptitude factors predict teaching performances. Teacher-aptitude by teacher-performance factors may be a better way of describing teaching performances.

3. The data suggest the possibility of describing teaching styles quantitatively. Attitudes related to aspirations are positively related to teaching performance factors that are also positively associated with aptitude factors. Such relations suggest that attitudes and aptitudes are predictors of internal states correlated with behavior in the form of teaching performances. Given the general stability of such factors as aptitudes and attitudes, it seems likely that combinations of them and their associated performances are descriptors of consistent teaching styles.

If such is the case, then an important question is whether these styles are modifiable. The question is important because some performances are ineffective, and if a teacher uses an ineffective performance because internal states are determining its use, changing the performance becomes critical. Since the attitudes and aptitudes are less likely to be directly modifiable, the problem becomes one of determining if the performances can be modified. Studies of the modifiability of teaching performances will be necessary to determine which policy alternative, selection or training, is more likely to be viable.

The use of the structural model in this study was designed to answer certain questions. The answers to those questions seem clear. Aptitudes influence performance. The relation of knowledge of the subject and methodology to performance is less clear. Organizational and administrative arrangements and style influence teaching performance, though the competing hypothesis that teachers and administrators are matched through the selection process must be considered.

In the section on recommendations for research, we suggest a number of approaches that are likely to improve our understanding of these relations.

Methodological Innovations

The design of the analysis of the data gathered for this study and the method of the data-gathering involved the use of procedures which have not appeared in previous research on teaching. We recommend that serious consideration be given to the use of these procedures in future research or to variations on them. It will be useful to recall what the original purpose of this study was in order to evaluate our recommendations.

The original purpose of the study was to determine which teaching performances were significantly related to pupil learning. A related purpose was to determine the degree to which factors such as pupil characteristics, teacher aptitudes, and administrative climate influenced either pupil learning or teaching performances. In previous studies of teacher effects and school effects, it has been customary to run correlation coefficients of various kinds between the factors thought of as independent variables and the dependent variables, in this case the measures of children's learning. There are several reasons why such an approach may be considered less profitable than the one used in this study. Consider an analysis of the relation between teacher aptitude and pupil learning. Assume that a substantial correlation was found between one or more measures of aptitude and pupil learning. A significant correlation is an indicator of a potential relation, but as is obvious, the relation

may be caused by a variety of other factors which are correlated either with teacher aptitude or with pupil learning or both. Finding a correlation between teacher aptitude and children's learning, while important, is one step beyond ignorance since we would have no way of knowing why such a correlation might have been obtained.

In recent years social scientists have been using such techniques as path analysis and multifactor-multivariate analyses to tease out the relations among factors so that hypotheses about causal relations may be made. Such techniques have the advantage of using all of the data simultaneously, and their procedures take into account the intercorrelations among the various factors. A review of previous research on teaching indicates that such techniques have not been used and that the investigators have been faced with the problem of interpreting zero-order, partial and multiple correlations. In attempting to interpret these correlations the investigator must rely heavily upon judgment, intuition and speculations about what may be the structure of relations in the variables. Such data at best indicate that a very large number of potential explanations is possible, but rarely does an investigator spell out all the alternatives, probably because the task would be exceedingly burdensome and the investigator would have no way of indicating which of the possible interpretations had greater or less validity.

A formal approach to this problem is to stipulate in advance a structural model which has a rationale and in which causal relations are hypothesized. If an appropriate technique is used to test this

model, such as path analysis, the result is that at least one network of potential relationships has been successfully tested. Since the original data base is available, alternatives to the structural model may be tested provided that the data gathered are relevant to the model being tested.

We recommend that this approach to the analysis of data on teaching performance and student learning be used in future studies. With the data in this study alternative models may be tested; for example, on the basis of the data in this study, we would no longer predict a direct relationship between pupil in-class behavior, defined by productivity and attentiveness as a potential causal agent of pupil learning. Our general expectation and some obvious reasoning led to the original prediction in our structural model, but in this study the relations between pupil behavior, described by path coefficients, and pupil learning were consistently nonsignificant. Or this relation could be pursued by refining the prediction; for example, predicting that attentiveness is related to development of reading comprehension in the fifth grade, and pupil productivity is related to decoding skills in the second grade.

Similarly the relationships between organizational climate and teaching performance should be revised. Our model assumed a direct relationship between organizational climate and variations in teaching performance. We suspect that there is a cluster of events that relates to organizational climate and teacher characteristics which is the antcedent of differences in teaching performance. We suspect that

teachers are selected in ways that group them in terms of the kinds of teaching they will do and the kind of teaching that is preferred or rewarded in the school. Such combinations of teacher characteristics and organizational climate characteristics represent a kind of school factor which would predict variation in teaching performances. (If such a model were to be tested, a complete sample of teachers by class within school should be involved in order to obtain stable estimates of school factors as they may be related to teaching performances.)

As the preceding paragraph suggests, two possibilities are open to future investigators. They can devise other models and use an existing data-base to test these models. Or, they can construct new models and gather data appropriate to the testing of those models. In either case the use of formal structural models is necessary on both technical and theoretical grounds. A formal theory of teaching does not exist at the present time, but the use of such structural models is a basis for developing networks of causal relationships, which can in turn be the basis for developing more formal theories of teaching. Each such model is in fact a theory of the relationship of variables related to the phenomena of teaching, and the test of that model is a test of the network of hypothetical relationships among the variables. When a sufficient number of such hypothetical relationships has been tested, theories, in the strict sense, can be generated.

Another methodological innovation in this study was the use of identical or similar pre and post-tests measures. Unlike previous studies, a variety of matched antecedent and post-test measures were

used. The advantage of using a decoding test, for example, at the beginning and at the end of the year or across some other time-span, is that the relationship between the entry scores and the final scores can be used as a basis for estimating the relative effects of other variables on the final scores. The data in this study indicate that the initial scores account for a substantial proportion of the variance in final scores. Therefore, the amount of variance to be accounted for by teaching performance independently of initial scores is relatively small, an important item of information in understanding how teaching relates to learning. This design model is the approrpiate one for testing the effects of specific teachers on the learning of the children they actually taught.

Obviously, in any study employing such a design, any number of other relevant variables may be entered into the pre-test battery, but we suspect that to the degree that such variables are measures of achievement or academic aptitude, the investigators will find that such variables are highly intercorrelated so that a pre-test measure on the criterion measure might be sufficient. We do not think that other kinds of variables, such as measures of cognitive style, ought to be used as a pre-test measure to be correlated with post-test measures unless an investigator has a hypothesis that the final scores are likely to be significantly influenced by cognitive style. If one wishes to consider such variables, we think it is more meaningful to look at the relationship between the cognitive style of the teacher and the cognitive style of the student. A similar comment would apply to other kinds of nonacademic or personality measures that could be used.

Another innovation in this study was the procedures used to gather data on classroom performance (we are aware that at least two other investigators are now using similar methods). In much of the previous research on teaching investigators have observed a limited number of teaching performances in the classroom. Usually an investigator begins with a hypothesis about the relations between one or more teaching performances and pupil learning, then gathers data on that performance which in turn is related to measures of pupil learning. In some cases the performances studied are probably only a small portion of the number of teaching performances in which the teachers engaged. As a matter of fact at the present time we do not have any general description of the kinds or variety or frequencies of performances in which teachers engage. But it is safe to say that in many studies the variables investigated were measures of a relatively small proportion of the number of performances in which the teacher actually engaged. As a consequence, the results of such research have generally been disappointing. We suspected that the reason for these disappointing results was that the array of performances measured was not sufficient to allow the identification of critical performances.

The approach we used in this study was to gather as much behavioral data on a classroom as was possible. We did not begin with preconceived notions of what data ought to be gathered. Rather, in the case of one instrument we used, we gathered all data that could be gathered by making specific behavioral recordings

during a class period. The other instrument which we used had been developed out of intensive observations of teachers, and while it was a category system, the categories were descriptions of behavioral performances that had been observed in many elementary classrooms.

Some people have been dismayed by the seeming lack of theory behind such an approach. We think that theories of teaching, or extrapolated or transported theories of learning, are much too weak to be guides to comprehensive observation in the classroom. One fact from this study supports the relevancy of this point. We observed that, on the average, 50 percent of teaching time was time in which students were engaged in seatwork. But there are no studies in the literature in which "seatwork" appears as an independent variable. Similarly, we know from practical experience, as well as from the observations in this study, that teachers either instruct children individually, or in groups or in the class-as-a-whole, but the literature does not reveal studies of these patterns for organizing instruction. Very little is known about what materials are used or how they are used. Our argument is that until an analysis of the phenomena as it can be readily observed has been made, one does not know that theories are likely to be relevant to explaining what occurs in the classroom. We recommend that in future studies as comprehensive a system of observation as can be managed be used to gather data on the classroom.

Even if such a system is used, however, a conceptual problem remains to be solved. Assume that two investigators both observe

classrooms independently. Each sets out to gather as concrete an information base about teaching behavior as can be gathered. After these data have been gathered, each investigator must organize them into meaningful categories. There are two ways in which to do this: one is to select a set of constructs in advance and look for representations of these constructs in the behavioral data; another is to group the data in what seems to be meaningful classifications.

Both procedures are appropriate ways of proceeding with a set of behavioral data, but it is necessary to find ways to interrelate the results of the combinations of behavioral data into different kinds of categories. It is essential to relate the categories derived from one system to those derived from another system. If such relations are not worked out, there is an infinite number of ways in which the same set of observations may be classified. What we will find is that some classifications are better predictors or as good as predictors as are other classifications. As a consequence we will have made little progress in understanding the underlying phenomena.

A forth innovation was the use of multifactor test batteries. Both the independent variables and the dependent variables were measured in terms of a variety of criteria. Multivariate studies are the only sensible way to proceed, given the present state of our understanding of teaching and its effects upon learning. There are several variations on the design used in this study which will utilize the power of such multivariate batteries; for example, the use of a general measure of decoding is useful if one wants to know the degree to which

students have improved their decoding skills over time. But a procedure in which components of decoding are measured at the time that the teacher is teaching for the acquisition of a particular decoding skill would improve our understanding of the relationship of teaching performances to the acquisition of decoding skills. Teachers may use different performances for such teaching depending upon the nature of the decoding skill being taught. Also, teachers may use a specific portion of the available time for the initial learning phase of the skill, and then expand this learning or review it at points in time. Some differences in children's learning may be associated with differences in the ways in which the skill is initially taught and differences in the way that it is reinforced, reviewed or transferred to other learning contexts.

Similarly a sharper distinction needs to be made between when the teacher is working on the acquisition of decoding skills and when the teacher is working on the acquisition of comprehension skills. Some teachers may keep the teaching of the two skills relatively separate, other teachers may integrate them. Only if the test battery is used more flexibly are we likely to be able to study such phenomena. In any case we strongly recommend the use of multifactor test batteries because as the results of this study clearly indicate, teaching performances may be related in different ways to different components of learning.

Recommendations for Future Research

Throughout this report we have made a number of observations which were presented as hypothesized explanations of particular relations found among variables. Each of these hypothesized explanations and others that may be thought of by other investigators should be considered as the set of potential hypotheses generated by this study. It should be recognized that hypothesis-generation at this stage of the art in research on teaching is inevitably speculations that investigators make about their data. The very nature of a field study is such that one cannot formally deduce hypotheses from the patterns of correlations and intercorrelations obtained in the study. But these speculations are usually meaningful and are the product of a careful study of the interrelations among the variables in the data, and therefore may be considered a set of hypotheses worth testing.

In this study, however, some formal hypothesis-testing was done because we used a structural model which posited relations which could be stated in the "if . . . then . . ." form of hypotheses. The predicted relations between teacher aptitude and teaching performance, for example, are a network of hypotheses which were tested in this study. In the following paragraphs we will make suggestions about the relative validity of these hypotheses and which of them seem to be worth pursuing.

Future investigations should consider the interdependencies among classes of teaching performances. Teaching context, for

example, embraces subcategories of teaching performances. A teacher who teaches in a group engages in particular kinds of interaction patterns in that group; he or she may use the group context as a way of giving an extended explanation; or the teacher may conduct a discussion, and the discussion may have different characteristics; or the period of group instruction may be used to ask questions about the reading material, and in effect become a substitute for the questioning of students on an individual basis. Thus the context of teaching in a group may embrace a variety of different interactive patterns. Similarly, individual instruction may embrace a variety of different patterns; for example, the teacher may move from student to student interacting very briefly with each student; or the teacher may stop and work with a child for a period of time. In all cases of instruction of this kind, the investigator should observe the nature of the activities in which the other children are involved.

Similarly because materials are an integral part of all instruction, seroius consideration should be given to describing both the nature of the materials themselves and how they are used. One important factor to study should be the degree to which materials are self-instructional or the degree to which they require or are enhanced by additional activities on the part of the teacher. Given some meaningful descriptions of variations in the characteristics of the material, interactive teaching performances ought to be studied in relationship to the characteristics of materials.

We are proposing that any future analyses of teaching performances, assuming that a comprehensive set of observations has been made, ought to organize variables by considering instructional context by interactive performance relations, or context by materials relations, or materials by interactive performance relations.

A second area for future research ought to be an analysis of the character of the processes being learned at any given point in time. There is considerable variation in the nature of the processes to be acquired in reading and in mathematics. The defining characteristics of a teaching event ought to be related to these characteristics; for example, if a teacher is working on the acquisition of decoding skills, the children are acquiring discrimination processes. An event of this kind ought to be tagged as an event in which the processes to be learned are of this character, and teaching performances ought to be related to that particular set of processes for which the learning task has been organized.

A third domain of analysis that should seriously be considered is the organization of sequences of learning tasks. In this respect an important aspect of teaching performance is to study the extent to which the teacher facilitates transfer of what has been learned in one learning task to what is to be learned in a new learning task. In order to study these patterns of relationships, it would be necessary to compress the periods of observation so that the teacher could be observed as he or she organizes new tasks, introduces students to them, and relates the new task to what the children have previously learned. It seems apparent that the learning

phenomena measured in this study required integrations of a variety of skills that had been acquired at different points in the course of the year. We suspect that some differences in learning may be related to the degree to which the teacher facilitated this integrative process.

The above paragraphs should make clear that we think that the problem in identifying effective teaching performances is a problem in finding performances which are related to underlying variables known to be effective in various kinds of instruction. The phenomenalogical analysis of teaching behavior has been useful in this study because we have identified major categories of teaching performances which are related to differential learning in children. But in order to understand the phenomena at a deeper level, the categories of teaching performances need to be organized by context, materials used and interactions within contexts. Contexts determine performances, materials determine interactions, and until the interrelations among these various components of the observable behavior are established, we will not have a meaningful picture of what is meant by a teaching performance.

Consider now other domains of variables whose relationships with teaching performance and learning were analyzed in this study. Clearly a variety of student aptitude and student characteristics factors relate to student learning. We think that these factors should simply be treated as correlates of learning in any future analyses. But we call attention to the varied relations between cognitive style and outcomes. It may be useful if future investi-

gators include cognitive style measures in their studies to identify more precisely how cognitive style affects various kinds of learning. The relations obtained in this study clearly indicate that cognitive style measures correlate differently in amount and sign with different measures of reading skills and mathematical skill and understanding. Perhaps some combination of style and initial score should be used as the pre-test correlate of post-test performance.

The pattern of relations between teachers' knowledge of the subject and teachers' knowledge of methodology of teaching is an area that needs refinement in measurement. Probably the appropriate way to proceed is to consider what is to be taught to the children and work back from this analysis to a description of what a teacher ought to know in order to teach the children. But a clear distinction should be made between knowledge of content and knowledge of process. Teachers generally have acquired basic phonic skills and probably are quite competent readers themselves. They may not, however, be equally informed about the processes involved in the acquisition of decoding and comprehension skills.

Also, most measures of teaching methodology rely heavily upon conventional wisdom about effective techniques. A more important area of study seems to be the relation between what a teacher has learned about methodology and how this knowledge affects his or her decision-making processes and how the teacher's experience affects his or her evaluation of what they have learned about methodology.

It should be noted that some teaching performances are unrelated to formal knowledge either of the subject matter or of methodology,

and may be related more to the personality characteristics of the teacher or to the teacher's perceptions of children than to formal knowledge. AP-13 (social control) is a way of reacting to individuals which one could acquire as part of one's life experience, and although some theoretical sense can be made out of using this particular way of exercising social control, it is unlikely that formal study of psychological theory is necessary in order to be effective in this respect. One suspects that teachers who have high scores on AP-13 are people who have certain kinds of personality characteristics; for example, there is reason to believe that they are likely to be high scorers on the field-dependent end of the cognitive style measure. This relation suggests that these teachers are likely to engage in this teaching performance for reasons that are related to the particular characteristics of students.

An obvious area for future research is the relations between teachers' aptitudes and teaching performances. As we have indicated at several points a variety of specific relations were found, and in the path analysis more significant path coefficients were found between the aptitude domain and the performance domain than between any other two domains. The general hypothesis tested in this study was that aptitude factors, being measures of underlying perceptual and cognitive processes, were determinants of performance. This hypothesis seems to be substantially supported by the results obtained in this study.

We think that the relation between aptitude and performance suggests an area for intensive research. We know very little at the

present time about how teachers think about teaching events. There were sufficient differences in the aptitude correlates of different teaching performances to suggest that teachers are systematically perceiving the teaching situation in different ways. If we know more about these variations in perception, we may find that it is how the teacher perceives and conceives of teaching events that is a critical factor in what they do. Analyses of these perceptions and cognitions may enable us to define the performance variables much more sharply; for example, if one looks at the data on the use of AP-6 (teacher-group), we see that it has different correlates than the performance, AP-7 (teaching the class-as-a-whole). Combinations by aptitude and teaching performance may be a fruitful way of organizing the independent variable.

We have suggested that organizational climate of itself is a relatively weak predictor of variation of teaching performances. We think that a new set of variables needs to be defined which relate particular characteristics of the organizational climate to the characteristics of the teachers in that organizational climate. There is reason to believe that there are systematic differences between districts in administrative style and organizational climate; but we are not convinced that there will be inter-school differences in these respects within the same district. We suspect that differences of this kind determine who is selected for employment within the district and may also determine who is selected for employment at the level of the individual school. Thus a teaching staff is a collection of individuals who may have been selected because the

school administrators perceived they had characteristics that would be matched with the characteristics of the organizational climate. If climate and teacher characteristics clusters of this kind are developed, one can determine the extent to which teaching performances relate to these clusters. If a relation of this kind is found, we have learned that it is the selection of teachers within the system rather than the organizational climate itself that determines the character of the teaching performance that will be observed in a class.

We are not optimistic that variations in organizational structure make a significant difference in how teachers teach. The kinds of teaching performances and styles that we studied are relatively common styles used by many different teachers. Team teaching arrangements do not substantially change the styles; they simply distribute them differently among students. Similarly as far as we can determine, teaching styles may be modified in only one important respect when the teacher has aides available. The teacher may either be a manager of aides or a manager of direct instruction who calls upon aides to assist in very specific respects. These two styles may not substantially change how the teacher teaches when the teacher is carrying the burden of instruction. The critical variable in organizational arrangements may be the extent to which different kinds of direct instruction is made available by different types of organizational arrangements. Sheer complexity of organizational arrangements in itself is unrelated to the character of teaching performances.

There are a number of areas of research that we think are either not worth pursuing as we pursued them or if they are pursued, the methodology ought to be changed. We have previously indicated that the category of pupil behavior is a relatively unproductive category. Only if some more refined measures of what is going on in the heads of children as they are being taught are developed are we likely to find the category of pupil behavior to be useful in predicting pupil learning.

In contrast, however, there are teaching performances which directly relate to the categories of pupil behavior used in this study, and it may be profitable to create clusters of performance by pupil behavior as independent variables related to learning.

Attitudes presented real difficulties in measurement. General attitudes toward reading and mathematics in the case of children are fairly stable over time, though in some cases there is a drop in positive attitudes by the end of the year. There are two problems here; first, we do not really know how sensitive such measures are to fluctuations in attitude. So what we may be seeing is a generalized drop at the end of the year in attitudes towards school rather than in attitudes towards reading or mathematics. Second, we know nothing about the fluctuation of these attitudes with respect to variations in the school and class events across the year. We propose for future research that attitude sampling be done more frequently during the course of the teaching year. We further propose that attitude measurement should be linked to different kinds of instructional events; for example, if the teacher is working on

the acquisition of decoding skills over a period of time, attitudes toward reading ought to be measured within that time period. Similarly, if the teacher is working on the acquisition of reading comprehension skills, measurements of attitudes ought to be made at that time. Different learning processes are involved in these two cases which may be of greater or less difficulty for a child, and at which he or she may be more or less successful. One would expect attitutdes to fluctuate as a function of such factors as how difficult the child is finding the learning and how successful he or she is at it.

Teacher expectations in this study accounted for only three percent of the variance in pupil learning, and are unrelated to differences in the age, sex or ethnic background of children. Two interpretations of this result should be made. First, teacher expectations as a general variable predict very little of the variance in children's learning. But, second, individual teachers may vary their teaching performances with respect to individual children in terms of their expectations for them. A more profitable line of research is likely to be one in which teachers' expectations and children's expectations are interrelated in patterns, and these patterns are related to variations in teaching performance and to learning.

Background characteristics of teachers do not seem to be useful domain to explore further. Such variables have historically been unproductive and this study has not reversed this trend. We have suggested that such characteristics be related to school character-

istics to form clusters that define distinctive differences in schools in terms of the kinds of teachers in the school as measured by these background characteristics, the organizational structure of the school and the administrative style of its principal. Clusters of this kind plus descriptions of characteristics of the children in terms of their home and community characteristics may be a more fruitful way of organizing these variable. Such new groupings can be thought of as ecological systems in which certain kinds of teaching performances occur. This approach would enlarge our understanding of the influence of school factors on learning.

The preceding discussion has a theme running through it. We strongly suspect that combinations of the domains which were treated as discrete categories of independent variables may be a more useful way to proceed in analyzing the effects of the independent variables that were studies. A combination of aptitude and teaching performances, for example, may cluster both the behavioral and cognitive-perceptual components of teaching acts, and such clusters may be better predictors of children's learning. Similarly, clusters of teachers' characteristics, organizational characteristics and home and community factors may be a better grouping for describing the ecology of teaching. Rethinking and reanalysis of the domains of independent variables is in our judgment necessary if future research is likely to be productive.

Another theme running through our recommendations is that teaching should be observed in episodes so that the specific learning tasks and their sequences may be identified. Such episodes should

also be described by the kinds of processes children are acquiring during these episodes. Measurements of learning should be taken by episode. An additional benefit of such designs is that teaching performances may be organized by context, by materials, by interactions, and by processes being learned. We think that variables defined by these factors in combination are likely to be better predictors of learning.

Summaries of Special Studies within the Total Study

Several special studies were conducted and reported for Phase II. The studies are of two general types; those in which segments of the information included in the major analyses of the study are examined more intensively, and those in which ancillary research questions were explored. Included were extended reports on the two systems used for live observations of teaching performance in the project classrooms; a description of teaching performance based on teachers' reports of their own instructional activities; a study of teacher aptitudes, knowledge and attitudes as predictors of teaching performance; and, a discussion of the relationships among teacher expectations and pupil performances. The ancillary research questions were addressed in reports on the evaluation of teaching behavior through observation of videotapes, the gathering and analysis of historical test data about previous pupil performance in the classrooms of the Phase II teachers and the development and pilot testing of a videotaped test of teachers' skills in diagnosing reading problems.

Intensive Studies of the Major Phase II Sources of Data

The APPLE Observational System

The APPLE* Observational System was one of two observational systems used in the study. The APPLE System involved a written

*APPLE Observation Variables and their Relationship to Reading and Mathematics Achievement, Nadine M. Lambert and Carolyn S. Hartsough, Volume III, Chapter 1, Phase II Final Report.

record of the behaviors of teachers and pupils. "Scores" in the form of prorated frequencies from the observations were used as measures of teaching performance and pupil behavior in the study.

The APPLE Observation System is a pupil-based system for recording behavior events in the classroom. Records of pupil behavior carry with them mandatory information describing pupil activities, the organizational structure of the classroom, the teacher's instructional activities and the teacher's response to the pupil behavior. Observers make English language descriptions of these events with mandatory information which are subsequently encoded by reference to APPLE Lexicons. The system is both a low-inference naturalistic observation process which retains the pupil behavior annotation, and also a system which yields categorical observational data. When the observations are treated as a category system, summaries of APPLE observation records measure pupil behavior, pupil activity, teacher activities, instructional context and teacher response using either the pupil or the classroom as the unit of analysis.

The system makes possible the combination of observation categories to yield measures of dyadic classroom variables such as combinations of Teacher Activity-Pupil Event, Pupil Event-Teacher Response or Teacher Activity-Teacher Response. In addition to behavioral records, the system incorporates a time recording feature so that it is possible to derive measures of duration of classroom behaviors over time.

At the completion of the 200 days of Phase II observations, we encoded the APPLE records, summarized the observation categories by classroom, and computed the classroom allocation of time spent in instructional contexts for reading and mathematics. To develop performance measures for reading and mathematics instruction, we analyzed the pupil activity field to assign observations to either reading or mathematics lessons. Next we summarized the observation record for each classroom and developed measures of teacher activities, instructional contexts, pupil behavior and teacher responses which can be considered to be directly or indirectly related to teacher performance.

From the discussion of the statistics describing central tendencies and variabilities of these data across classrooms, instructional areas, and grade levels, several statements summarize the pupil and teacher behavior in the classrooms.

1. Observed pupil behavior is a function of the instructional area, the instructional context and the teaching activities. This finding means that one must expect to find different types of pupil behavior and differing frequencies of pupil behavior, depending on whether the child is a second or a fifth grader, whether he is involved in reading or mathematics lessons, whether he is working with the teacher independently, and what the activity of the teacher is.

2. In general, we can conclude that fifth graders will be expected to spend more of their classroom time working independently of the teacher for both reading and mathematics activities than will

second graders. While there is considerable variability among second grade teachers in the use of different instructional contexts, second grade pupils will be involved in more teacher-directed instruction than fifth graders.

3. The quality of teacher responses to pupil behavior is very similar across both grade and instructional area. The response of "None" to observed pupil behavior occurred about two-thirds of the time. We do not mean to imply that a teacher response should accompany every observed pupil behavior; rather the data indicate the probability of the occurrence of any teacher response to pupil behavior in the classroom.

4. In organized instructional periods such as reading and mathematics, conduct problems and need for teacher disciplining are not common. This finding suggests that supervisors, and others who visit classrooms, cannot rely on the absence of conduct problems as good evidence for teacher competency. Inappropriate behavior during academic lessons was relatively rare.

When we examined teacher performance with respect to the ways teachers distributed classroom instructional time in different contexts, these generalizations followed from the descriptive statistics.

1. Second graders spend more total minutes in reading instruction than do fifth graders, and this is primarily reflected in more time spent in group instruction and time spent being taught by other adults. Independent-Individual contexts, those contexts in which pupils are working on an individualized assignment different from

other pupils and independently of the teacher, were more common in second grade reading than in second grade mathematics and also more common than in fifth grade instruction.

2. One surprising finding was that the average proportion of pupil productive time in individual contexts in reading was relatively small. Few pupils receive such instruction and of those who do, the average percent of productivity as judged by the observers was lower than the percent of gross productivity. This finding implies that the teacher's choice of this context for certain pupils is not always a wise one. Only those pupils who can manage such a context for significant periods of time (probably greater than 5 to 10 minutes) are likely to profit from it at all.

3. The primary difference in time allocation in mathematics between grades was the relatively greater proportion of time spent in Teacher-Class contexts at second grade.

4. The time spent in Independent-Individual, Adult-Individual, Teacher-Individual and Adult-Group contexts is not generally productive time in mathematics when the percent of productive time was averaged across pupils. However, when the gross productive time was computed by finding the proportion of productive time by classroom, rather than averaging across pupils, the productivity rate for these contexts was as high as for other contexts. This finding, along with the similar result reported for second grade, indicates that only a few pupils work productively in individual contexts. Therefore the average pupil productivity is lower in individual contexts than it is in settings where instruction is by group or by class. However, individual contexts are appropriate and productive for

some pupils. Thus, when one looks at the rate obtained by dividing total productive time for all target pupils by total time in that context for all target pupils, the productivity is higher.

The great variability in pupil and teacher behavior between grade levels and between instructional areas leads to the preliminary conclusion that we cannot expect to find a set of teacher performance variables which will be valid for predicting learning outcomes across grade levels and instructional areas. The results of the partial correlations between observation variables and the reading achievement measures support this initial impression. Some of the generalizations that we can make on the basis of correlations between observation variables and reading achievement are:

1. Talking out inappropriately in classrooms during reading instruction was uniformly related to poorer reading outcomes. There was also an inverse relationship between the observed frequency of pupil behavior which was not consistent with teacher expectations (but not necessarily serious enough to warrant teacher intervention) and achievement outcomes.

2. Evidence of positive achievement in phonics skills was positively correlated with outcomes for second grade and negatively correlated with reading outcomes for fifth grade. This suggests that teacher instruction in phonics skills enabled second graders to improve their achievement. However, it appears that teacher instruction in phonics at fifth grade was directed at pupils with learning difficulties and perhaps was not the most effective means by which to improve learning for all pupils in the classroom.

3. Conversely, evidence of positive achievement in oral reading was positively correlated with outcomes at fifth grade, but not at second grade where oral reading is regularly observed for all pupils in reading instruction.

4. With regard to teacher activities, we offer the tentative hypothesis that the more the teacher is involved in organizing the class for instruction (as evidenced by negative correlations between activities like "Academic Organizing," "Asking Questions," "Discussion," and "Instruction-Giving," and reading achievement) and the less the teacher is involved in "Working With" pupils and "Checking" to see if they are understanding their work, the poorer the end of the year reading achievement. We do not intent to imply that teacher activities like "Academic Organizing," "Asking" questions and so forth are not important teacher performances. However, as the frequency of these activities increases, the frequency of actual instruction decreases. Consequently there will be reduced opportunity for reading instruction, resulting in less improvement in reading at the end of the year.

In comparison to reading outcomes, a different set of observation variables were valid for predicting mathematics learning. The following conclusions follow from the analysis of the validity of the observation variables:

1. In second grade mathematics lessons during which there is a high frequency of inappropriate conduct, obvious inattention to classroom work, and talking out of turn, there is more likelihood that achievement scores in mathematics will not increase as predicted at the end of the year.

2. Though noticeably inappropriate behavior did not characterize fifth grade pupils in mathematics assignments, the frequency of inattention to task which was not disruptive or particularly noticeable was uniformly negatively correlated to mathematics learning.

3. The frequency of Independent-Group and Independent-Class contexts was negatively correlated with achievement outcomes at both grade levels, suggesting that classrooms in which pupils were working independently of teachers most of the time were those with poorer mathematics achievement.

4. A surprising finding was that teacher instructional activities were observed with less frequency in mathematics than in reading. Only "Asking" had a significant correlation with outcome and it was negatively correlated. The tentative conclusion is that teachers who spend time asking questions are those whose lessons are not understood or whose assignments are at an inappropriate level of difficulty.

5. Six out of 12 teacher responses at fifth grade and three of 12 at second grade had a significant relationship to mathematics achievement. At second grade, teachers who employ disciplining, recognizing, and redirection have poorer than expected achievement. At fifth grade, giving help, providing positive feedback, and praise are positively correlated with achievement. Recognizing and redirecting are negatively correlated with mathematics learning at fifth grade.

A most interesting finding was that teacher performance variables which have a valid relationship to children's learning may have an inverse relationship to changes in children's attitudes toward learning and toward themselves.

1. Different sets of appropriate and inappropriate pupil behavior were correlated with reading and mathematics attitudes and for second and fifth grade. We have to conclude, therefore, that it is unrealistic to assume that one can define an omnibus set of teacher performance variables, which, if present in a group of teachers, will guarantee positive learning outcomes as well as positive attitudes.

2. With respect to attitudes toward reading and mathematics, second grade classrooms in which target pupils were observed to be positively engaged in the activities of the class and in which they were not misbehaving or talking out inappropriately were those with the most positive attitudes at the end of the year.

3. Since the Pupil Survey items ask questions about how children judge their abilities with respect to peers, it was not surprising that some pupil event variables evidencing appropriate pupil behavior had negative correlations with the survey measures. In some classrooms, positive participation of target pupils may cause pupils to contrast the adequacy of their performance unfavorably with that of their classmates, resulting in a negative correlation between some positive behaviors and the survey measure.

4. At second grade, "Academic Performance," "Attentiveness" and "Direction Following" had a positive relationship to the survey

measure suggesting an age difference in the implications of these types of pupil behavior on attitudes toward self-worth.

5. There seemed to be no significant relationship between the incidence of the instructional contexts and attitudes across either grade level or instructional area. Attitudes, therefore, are more dependent on teacher and pupil behavior in the classroom.

6. The teacher activities which are significantly related to attitude and are always positively correlated with attitude and survey outcomes across instructional area are: "Checking," "Listening," "Supervising." Those with uniformly significant negative correlations are "Circulating" and "Instruction Giving."

7. Teacher responses to pupil behavior had different patterns of relationships to attitudes according to whether teacher responses were observed in reading or mathematics and whether pupils were second or fifth graders. The data indicated that the incidence of disciplining and negative feedback in a classroom cannot be judged to be always negatively correlated to general attitudes in the classroom. On the other hand, the extent of positive feedback was always positively related to attitudes when the partial correlations were significant.

8. From the analysis of teacher activities and responses, we tentatively infer that teacher behavior which calls attention to children, and perhaps places them in an unfavorable comparison with their classmates, may have a negative affect on attitude, even though these same teacher behaviors have a positive relationship to achievement outcomes.

The criterion of retention of an observation variable as a potential measure of teacher performance was a significant relationship with two or more outcome measures. The criterion of retention for attitude outcomes was a significant correlation with outcomes at either or both grade levels. Using these criteria of retention, only a handful of APPLE variables could not be considered potentially valid teacher performance measures. However, there are enough differences between grade levels and between reading and mathematics instruction that we cannot generalize across grades and instructional areas regarding which teacher performance data will always be valid for predicting pupil achievement or attitude outcomes.

The length of time pupils spent in some instructional contexts relates to achievement and attitude outcomes. Some of the interesting findings were:

1. The more time pupils spent in individual contexts in second grade reading, the better their performance in reading comprehension.

2. While the amount of time second grade pupils worked independently and productively in individual contexts was correlated with the reading comprehension measures, the amount of time the teacher spent conducting reading lessons for the class was significantly correlated with the Decoding Test. The data offered clear evidence that the learning of decoding skills at second grade was dependent upon the amount of learning time during which the teacher is in charge of class instruction.

3. The amount of learning time in context does not always have a positive relationship to outcomes. An example was the negative

correlation between the Independent-Group contexts and the reading measures. Time measures may have a curvilinear relationship to achievement. Some effort to determine the amount of time which is the optimum for learning in each context would be an excellent way to extend our understanding of the relationship between the duration of classroom experiences and learning.

4. Fifth graders who spent more time in contexts where teachers are in charge of instruction have higher scores on reading comprehension measures.

5. The most effective context time allocations for mathematics learning were the several individual contexts. Even though individual contexts were common to only a few BTES classrooms, the data indicated that the more time second graders spent in individual contexts, and the more this time was productively spent, the better their mathematics learning.

6. While time spent in individual contexts in mathematics was important to second grade mathematics achievement, the amount of time pupils were taught mathematics by the teacher in fifth grade classes was significantly related to outcomes.

7. Both mathematics and decoding skills require rule and principle learning and practice in applying these rules and principles. The more time the teacher spends directing these learning experiences, the better the learning outcomes.

To summarize, the results of our preliminary examination of the relationship of these variables to student learning and attitude showed that performance does make a difference when the effects of the initial learning and attitude are controlled.

While pupil behavior varies from second to fifth grade, presumably due to differences in teaching activities and learning task, teacher responses to pupils, and the quality of teacher responses to pupil behavior are remarkably similar from second to fifth grade. We infer that the ways teachers respond to children's behavior reflect stylistic and personality differences rather than differences attributable to the age of the children they are teaching.

In organized instructional periods disruptive conduct problems and need for teacher discipline are not common and these variables were not significantly related to pupil learning. This suggests that assessing teacher competence on the basis of the absence of behavioral problems during reading and mathematics instruction would be risky indeed.

Classroom summaries of pupil characteristics which do make a difference in reading are the frequencies of observed reading behaviors, and the frequency of on-task learning behaviors at second grade, and at fifth grade the frequency of observed reading behavior, evidence of participation in classroom activities and on-task behaviors. The frequencies of on-task pupil behaviors were significantly related to mathematics learning for both second and fifth grade. When we infer teacher performance from pupil behavior, we base it on the assumption that pupil behavior reflects the teacher's planning, instruction and management.

Several teacher activities were associated with reading achievement outcomes at second grade. These could be described as the extent of direct instruction in reading as opposed to frequencies

of observations of organizing the lesson and explaining what the children were to do. Fewer teacher activity variables were significantly related to reading achievement at fifth grade presumably because fifth graders spend more time working independently of teachers at this level. Teacher feedback responses were associated with improved achievement in both reading and mathematics at both grade levels.

Of considerable interest, and worthy of additional study, was the finding that using the classroom as the unit of analysis, APPLE observation variables which were significantly associated with reading and mathematics achievement were not necessarily those associated with positive attitude change. The fact that teacher performance variables which were related to significant increases in the criterion measures were specific to those measures indicates that we must study teacher performance with multidimensional outcome criteria.

In general the data reported support the use of a behavior recording system as a valid tool for studying teacher performance characteristics. The APPLE system makes a few a priori assumptions about the nature of teacher and pupil behavior, can describe pupil and teacher characteristics with considerable fidelity, and identifies those pupil and teacher behaviors which are significantly related to learning and attitude outcomes for a particular grade instructional area.

The RAMOS Observational System

The RAMOS* Observational System was one of two observational systems used in the study. The RAMOS System is a time-based category system of observation. "Scores" from the observations were used as measures of teaching performance for the analyses done in the study.

The Reading and Mathematics Observation System, RAMOS, is designed for real time documentation of classroom activities of teachers, student groups, or individual students. It is best suited to observation of classroom instruction in the areas of reading and mathematics at the elementary level. With it, a trained observer can record the events in a regular classroom within his view in comprehensive detail and in real time. The system permits the observer to focus either on the teacher, a group of students, or a small number of target students, depending on the purpose of the observation.

Once an observation interval (generally between 30 minutes and an hour) is initiated, the observer records the events that transpire as a series of "lines," each line containing categorical entries describing the nature of the event. These lines provide answers to such questions as:

Who are the students being observed?

How many are there in the group? Where are they located in the room? Which target students, if any, are in the group?

*Reading and Mathematics Observation System: Description and Analysis of Time Expenditures, Robert Calfee and Kathryn Hoover, Volume III, Chapter 2, Phase II Final Report.

Who are the adults in the classroom?

How many adults are there? Where are they, and with what student groups are they associated?

What is going on at any given time?

What is each student group and adult doing? If engaged in an instructional activity, how many students and adults are involved, and where are they?

Who is doing the instructing?

What is the nature of the instructor (teacher, aide, volunteer, tutor, etc.)? What role is the instructor playing (direct instruction, discipline, class management, etc.)?

What is the content of instruction?

What subject matter is being taught? What skills and activities are involved? What materials are being used? What kinds of feedback are available to the students?

What is the response of the group to instruction?

What kinds of responses are required or expected of the students? What is the judged level of attention to instruction? Relative adequacy of performance? Amount of social interaction between students?

From the records obtained in this manner, several measures have been extracted for the purposes of the study. The primary aim of these measures is to describe the manner in which time is used in the classroom. The measures include: (1) total time spent on activities directly or indirectly related to reading and mathematics,

(2) the character and variety of those activities, and (3) the relative distribution of time spent in various activities.

The basic unit of analysis for the RAMOS protocols is the student-minute--a single number minute of student time during a class period. The RAMOS analysis program computed, within each category of the system, the number of student minutes falling within each of the codes assigned to that category.

The particular interest in the study was to uncover any strong relations of teacher characteristics and practices to student outcomes in reading and mathematics. Accordingly, time usage in the areas of reading (and other closely allied language arts) and mathematics was chosen for analysis. Within these subject matter areas, four major categories were selected: Role of the instructor, Aim of instruction, Instructional activities, and Main materials. These categories answer the questions: What was the teacher doing, to what purpose, by what means, and with what resources? Some of the major conclusions were: The breakdown of time usage by grade and subject matter for the category of role of the instructor suggested that:

1. Reading and language arts are more likely to proceed by direct instruction, whereas mathematics is more likely to be under the student's control with the teacher providing help when the student asks for it or when the teacher sees something that requires her/his attention.

2. The breakdown of time usage by grade and subject matter for the category of Aim of instruction suggested that practicing skills accounted for most of the student minutes. Relatively little time was spent on new ideas or topics.

3. The breakdown of time usage by grade and subject matter for the category of Instructional activities suggested that students spent most of their time at seatwork. Fifth graders were observed to do so much more than second graders, and seatwork was observed more in mathematics than in reading.

4. The breakdown of time usage by grade and subject matter for the category of Main materials suggested that there are large shifts in patterns of materials usage which are a function of grade level and subject matter. Books are used more in reading than in mathematics, and more at the later than the earlier grades. Workbooks are common everywhere, but especially in second grade mathematics. They also occupy a surprising amount of time in fifth grade language arts and reading. Students are left on their own with paper and pencil about 15 to 20 percent of the time.

The Reports Of Teachers About Their Instructional Activities

Teacher reports* of their instructional activities and procedures were used as one source of descriptive information about classrooms. Different kinds of "scores" from these reports were used as measures of teaching performance for the analyses done in the study.

*The Reports of Teachers' About Their Mathematics and Reading Instructional Activities, Patricia Elias, Gail Hare, and Patricia Wheeler, Volume V, Chapter 5, Phase II Final Report.

The third type of "Teaching Performance" variables were derived from the Work Diary scores. Scores were aggregated from the several instruments teachers used to describe their instructional activities. The data were provided from five instruments:

1. The Reading Program Overview was intended to provide a summary of the teacher's reading program for the entire school year. It was completed once by teachers.

2. The Reading Work Diary was designed to reflect the instructional process during one school week. The diary was completed twice.

3. The Mathematics Program Overview was intended to provide a summary of a teacher's mathematics program for the entire school year. It, like the Reading Program Overview, was completed once by the teachers.

4. The Mathematics Work Diary was parallel to the Reading Work Diary and was designed to reflect the instructional process during one school week. The Diary was completed twice at the same time that the Reading Diary was used. Both were completed during two target weeks which were eight calendar weeks apart.

5. The Reading and Mathematics Work Diary for Paraprofessionals and Other Teaching Adults in the Classroom also covered a one week time period and was intended to describe the functions of adult assistant in the classroom. It was completed twice by each adult assistant in a classroom at the time the Reading and Mathematics Work Diaries were completed by teachers.

The information from the battery was organized to indicate, by grade level and within subject areas, the academic emphasis, the quality of the teaching methodology, the complexity of the organizational structure, and the variety and types of instructional materials used. The scores reflected different metrics such as time or frequencies. The two academic emphasis scores were the actual time spent preparing for and teaching reading or mathematics, and the frequencies that teachers reported for teaching specific kinds of reading or mathematics skills.

Teacher reports of their instructional activities and procedures proved to be interesting and potentially valid sources of descriptive information about classrooms. The validity of sections of the teacher reports was tested against observational information from the project classrooms as well as pupil skill growth in reading and mathematics. Some of the major findings from the analysis of the Work Diaries and Program Overviews were:

1. Second grade teachers spent more time preparing for and teaching reading than did fifth grade teachers.

2. Fifth grade teachers spent more time preparing for and teaching mathematics than did second grade teachers.

3. The amount of total teacher preparation time had an inverse relation to pupil skill growth in reading and no relation to skill growth in mathematics.

4. The amount of direct teaching time had some positive relationship to pupil skill growth in reading and no relationship to pupil skill growth in mathematics.

5. Pupils were groupsed differently for reading and mathematics instruction. Simultaneous instruction of all pupils was the most common pattern used for mathematics instruction, and grouping by reading level was the most common for reading instruction.

6. The simultaneous instruction of all pupils in reading was related to fifth grade pupil growth in application and total reading skills, but was associated with poorer second grade pupil performance in reading application tasks. That grouping strategy related to second grade pupil skill growth in decoding.

7. Grouping pupils for instruction based on their general reading level was associated with application skill growth for second grade pupils, and poorer decoding skill performance for fifth grade pupils.

8. Individualized reading instruction was associated with poorer second grade pupil performance on reading application tasks.

9. Pupil skill growth in reading, particularly that of second grade pupils, was associated with the proportion of pupils taught exclusively by their teacher.

10. The use of the state adopted reading basal textbook series was associated with second grade pupil growth in application skills.

11. The use of the state adopted mathematics basal textbook series at fifth grade was associated with poor pupil performance in computation skills.

12. The use of programmed materials was associated with second grade pupil growth in computation and total mathematics skills.

The Relationship Of Teacher Aptitudes to Teaching Behavior

A battery of tests measuring verbal, reasoning, memory, and divergent production aptitudes, knowledge of teaching, knowledge of the skills required in reading and mathematics, attitudes toward teaching, expectations of and satisfaction with teaching as a career, and the cognitive style of field dependence-independence were administered to California elementary school teachers.*

As part of a project to investigate the relationship between teacher characteristics and pupil learning, a substudy was made to determine the impact of selected teacher variables, such as aptitude, knowledge, attitude, and cognitive style on classroom teaching behavior. Such research may eventually make it possible to select for teacher training those individuals who have the greatest likelihood of being successful in learning those teaching behaviors which result in optimum pupil learning.

Based in part on the findings of earlier research, we hypothesized that teaching behaviors would be influenced directly by teacher aptitudes and that the aptitudes would also affect teaching behavior indirectly through differences in teacher knowledge. Attitudes and cognitive style were also expected to have a direct effect on teaching behavior.

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*The Relationship of Teacher Aptitudes to Teaching Behavior, Ruth B. Ekstrom, Volume V, Chapter 1, Phase II Final Report.

The subjects were all of the teachers in the Phase II study. All of the teachers took a battery of tests including measures of verbal aptitude; quantitative aptitude; inductive and logical reasoning; associative and meaningful memory; associational, expressional, and ideational fluency; semantic originality; semantic redefinition; sensitivity to problems; spontaneous semantic flexibility; knowledge of teaching reading; knowledge of teaching mathematics; decoding ability; inferential reading ability; numerical speed and accuracy; attitudes toward teaching reading and mathematics; expectations for and satisfaction with teaching as a career; and the cognitive style of field dependence-independence.

Factor analysis was used to reduce the number of aptitude variables. Different factor structures were found for the two groups of teachers. The aptitudes for the second grade teachers were interpreted as: meaningful memory, flexibility in reasoning, verbal productivity, and reasoning. The factors for the fifth grade teachers were interpreted as: verbal reasoning, memory, nonverbal reasoning, and verbal fluency and flexibility. To obtain comparable factors for the two levels, a target solution was used. The resulting factors, verbal fluency, memory, reasoning, and flexibility, were highly congruent with the earlier solutions (coefficients over .90).

The teacher behaviors were obtained from an analysis of teachers' work diaries and from two classroom observation systems, RAMOS and APPLE. Correlations were obtained among the teacher characteristics variables and the teaching behaviors.

These four factors were entered into a path analysis to determine the direct effect of the aptitudes on teaching behavior and their indirect effect, through both teacher and pupil behavior, on pupil learning.

Teacher verbal fluency was consistently related to the teacher behavior measures of quality of teaching methodology and teacher flexibility negatively related to the measures of time spent on organizing, helping, instruction giving, and supervising. At the second grade level, teacher flexibility was most negatively related to the use of independent teaching context, less negatively related to group instructional context, and positively related to instructing the whole class. There were large negative coefficients between teacher reasoning ability and the quality of mathematics teaching methodology.

These data suggest that further exploration of the predictability of teaching behaviors from teacher aptitudes would be promising. Verbal fluency seems to predict the quality of teaching methodology, while reasoning ability, as defined by these measures, is negatively related to teaching quality. Flexibility is negatively related to time spent organizing and supervising instruction and to instructional responsiveness to pupils. It shows a strong relationship to second grade instructional organization practices.

Teacher Expectations and Pupil Performance

The relationship between teacher expectations and student performance* was investigated, utilizing a longitudinal non-experimental design. Two general areas were discussed: the relationship between the expectation of teachers about pupil performace and actual pupil performance; and, the relationships between teacher expectations and student characteristics which provoke those expectations.

The measure of teacher expectation for student performance was the rank given to the student by the teacher in response to the request to rank the students in her or his class according to how well the teacher would expect the student to perform on a standardized test of reading/mathematics achievement. In a separate instrument, teachers were requested to provide information regarding each of the students in her or his class. The teacher identified the child's gender, racial identity, the number of schools attended and length of duration, and the teacher's estimate of the student's socioeconomic background. Student scores on the CAT reading and mathematics computation tests were the indices of performances used. The results, in summary were:

Do teacher expectations produce differential student learning?

1. Teacher expectations were modestly but consistently and significantly related to spring student achievement when the effects

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*Teacher Expectations and Pupil Performance, Marlaine Lockheed, Volume V. Chapter 2, Phase II Final Report.

of entry level skills had been partialled out. Teacher expectations accounted for about three percent of the variance in spring achievement, and that relationship was consistent for both second and fifth grade students in both reading and mathematics.

2. Although small, the contributions to the variance in student academic growth provided by teacher expectations was greater than the contributions of the more conventional demographic indices such as sex, race and social class.

3. When students were grouped and analyzed by high, medium and low levels of teacher expectations, the higher expectation students who performed at the mean levels of academic performance in the fall achieved higher scores in the spring than did medium or low expectation students with similar initial scores.

4. When spring test scores were adjusted for sex, socio-economic status, race and years in school for students grouped by high, medium and low teacher expectations, there was a small, but consistent, difference (about 1/2 of a standard deviation) in spring achievement that could be attributed to teachers' expectations.

What student characteristics provoke differential teacher expectations?

1. Student achievement was the most significant predictor of teacher expectations.

2. The sex of a student was a significant predictor of teacher expectations in reading at both grade levels, but not in mathematics.

3. Teacher perception of social class was a significant predictor for mathematics at both grade levels and for reading at grade two but not at grade five.

4. Student race was a significant predictor, but in a direction opposite to that predicted. Teachers held higher expectations for non-whites than for whites in reading at both grade levels, and in mathematics at second but not at fifth grade.

5. The longer a student has been in the same school the lower the teacher expectations were for second grade students' achievement in both reading and mathematics and for fifth grade student achievement in reading.

6. There was a trend toward greater academic gain for students who possessed the characteristics for which teachers indicated greater expectations for academic growth.

Phase II Special Research Studies

The Evaluation of Videotape Recordings of Teacher Behavior

Teaching behavior was investigated through the observation of videotape recordings.*

Project videotapers recorded the teaching of 94 volunteers taking part in the BTES study. Most were taped three times on one visit, but a subsample of 12 teachers was taped on three of four separate occasions. The purpose of the subsample was to provide information about the consistency of observed behavior over time.

Several instruments were created or adapted for use in analyzing the videotape recordings. Two new lexicons for obser-

*The Evaluation of Teaching Behavior Through Observation of Videotape Recordings, Jonathan Sandoval, Volume III, Chapter 3, Phase II Final Report.

vation were developed, the Teacher Instruction Lexicon and the Teacher Feedback Lexicon, which are devoted primarily to the observation of teaching behaviors. The Teacher Instruction Lexicon is a listing of the various categories of teacher behaviors used in conducting a lesson to one or more children in the classroom: introductory remarks; explanations or expository remarks a teacher might make in the course of presenting information to be learned; and, questioning or testing behaviors a teacher might use to stimulate mastery learning in pupils or to evaluate what learning has taken place.

The Teacher Feedback Lexicon is an exhaustive listing of the ways in which teachers report information back to pupils about the pupil's performance in learning or in following classroom rules. Across the three general categories of (1) Positive Responses, (2) Non-Committal Responses and (3) Negative Responses, five kinds of responses were recorded: simple informational responses that are elaborations, responses that are "socratic" reactions, responses that are praise or punishment acts, responses that are attempts to create peer involvement, and responses that involve ignoring.

Two Videotape Rating Scales were also developed. The items on these schedules are concerned with the pace, tempo and variety in the lesson, the teacher's movements and enthusiasm, the organization and emphasis of the lesson, the teacher's empathy for the students, the pupils' reaction fo the lesson, the teacher's questioning

strategy, and the Rogerian concepts of warmth and honesty. Observers rated performance after coding each reading and mathematics tape with the Teacher Feedback Lexicon.

Because the lexicons were new and needed to be validated, a standard observation system was employed, Flander's Interaction Analysis, which could be used to serve as a benchmark against which to evaluate the utility of the new systems. All of the instruments were used in coding the videotapes recorded in the subsample classrooms. To judge whether or not the teacher behaviors on videotapes are consistent aspects of the teacher's style over time, the subsample of the teachers was videorecorded on four occasions. Only the new observational or rating scale items that had demonstrated inter-rater reliability were used to evaluate classroom consistency. In general, most of the observed and rated teaching performances were stable over time. The rating and observation systems were then evaluated and simplified for coding tapes from other project classrooms.

What kind of information can be obtained by observers/viewing the videotapes? Some examples from the descriptive sections of the report will be used to illustrate the different kinds of teaching behaviors observed.

1. How common are various instructional behaviors? Teachers at the elementary level spend most of their time giving facts, asking simple questions and giving directions about how to do something. On the other hand, the teachers rarely stimulate recall of prerequisite skills in the process of giving a lesson, rarely give appliation of ideas they are teaching, rarely contrast and compare ideas, almost

never ask for negative opinions, and do not often attempt to determine if a child has mastered a concept.

Reading and mathematics lessons appear to differ in the instructional events observed. There are more explanations given in mathematics lessons whereas in reading there is more cueing and asking follow-up questions for additional information. There does not seem to be much difference in the frequency of the various instructional events in the second and fifth grades. The substance, the content of the events, undoubtedly does differ between grade levels, but not the absolute occurrence.

Teachers in lower class schools seem to differ from other teachers in that they are less prone to state facts, are less likely to give explanations and are less likely to ask if information is understood. In general there seems to be somewhat less verbal behavior in these classrooms than in others. Teachers in upper middle class schools, on the other hand, state facts more often, ask more frequently if information is understood, and engage in less direct cueing than do other teachers.

2. What feedback techniques are commonly used by teachers? The most common reaction to positive achievement in the classroom is to inform the pupil simply that he is right, without much embellishment. General praise is a distant second in frequency as a response to positive behavior.

When there are both right and wrong elements in a child's answer to a problem or a question, it is common for the teacher to attend to the negative aspect of the response or to simply

acknowledge hearing the response. In giving feedback teachers also frequently attend to only the positive aspects of the response and often ask the child to elaborate.

Reacting to poor achievement, that is to a poor answer or an incorrect answer to a question, teachers most often ask a child to try again, tell him he is wrong, or supply him with the right answer. Most puzzling is the fact there there is very little guidance given when errors are made. Second grade teachers are more likely to ignore positive achievement and to direct a child to try again, should he fail. Fifth grade teachers, however, tend simply to acknowledge hearing a mixed positive and negative pupil achievement. Fifth grade teachers are more likely to reprimand a pupil for an academic failure than are second grade teachers.

It appears that teachers of lower class pupils seem to give more simple knowledge of results and fewer elaborated knowledge of results for achievement. They also use more general praise than do other teachers. They ignore positive achievement less, and they more often ask pupils to elaborate when there are both positive and negative aspects to what they have done. Some teachers in upper middle class schools are more likely to reprimand a child for failing than are other teachers, which may reflect high expectations for performance.

Although teachers do tell pupils that they are correct when they are behaving well, they are much more likely to reach or attend to negative behavior. Some teachers do attend to the positive when both positive and negative behavior occurs. The usual reaction is

a verbal reprimand, directions to proceed with an assigned task or directions to stop the behavior. Very few teachers purposefully ignore negative behavior, and very seldom does a teacher involve peers in giving feedback to children whose behavior was inappropriate.

Again there are few differences between second and fifth grade classrooms, the only notable one being the fact that misbehaving second grade pupils are told more often to proceed with an assigned task than are fifth grade children. Misbehavior is reacted to in the same way, whether in a reading lesson or in a mathematics lesson.

There are more feedback events of all types observed in the tapes of teachers in lower class schools, reflecting the possibility that there is more nonachievement oriented behavior in these classrooms. There is more praise and recognition for good behavior in the lower socioeconomic status (SES) classrooms, but there is also more attention to negative behavior and directions to get on with an assigned task.

The information contained in the preceding paragraphs needs to be evaluated in future research. The fact that a particular event is infrequently observed does not mean that the event is not an important behavior. In many cases, the very fact itself that a teacher exhibits a particular behavior is more important than the number of times he performs that behavior. The frequency data, then, must be used with great care in designing future experimental research.

Do Teaching Behaviors Relate to Pupil Achievement? The relationship between the teacher behaviors obtained from the videotapes and pupil achievement was estimated by correlating the observational

variables with the mean adjusted spring achievement and attitude measures across the total group of second and fifth grade classrooms.

It should be noted that we are correlating variables derived from the viewing of one 40 minute segment of videotape collected at one time during the school year with measures of pupil growth across an academic year. To expect many meaningful relationships to emerge from such a limited sample of a teacher's behavior is extremely optimistic. Any relationships which do emerge should be considered very seriously as important aspects of teacher behavior to be further examined or explained. For this partial correlation analysis, the Teacher Instruction observational variables collected during reading lessons were related to the California Achievement Test (CAT)-Reading Comprehension and to the ETS developed Reading Attitude measure. The observational variables obtained from the mathematics lesson tapes were related to the CAT-Mathematics Concepts, the CAT-Mathematics Computation, and the ETS developed Mathematics Attitude measure. Three of the Teacher Instruction Behavior categories are related to achievement or attitude toward subject matter. Some of the results are described in the following section.

During fifth grade reading instruction, the more expository remarks made by the teacher, the better is the pupil's attitude toward reading. Evidently the more the teacher talks about the reading assignment and gives facts, examples, summaries, and applications, etc., the better the pupils feel about reading and reading lessons. On the other hand, at the second grade, the more a teacher makes expository remarks, the less well the pupils do

at acquiring mathematical concepts. Perhaps listening to the teacher and working with materials may be mutually exclusive in a second grade classroom.

Giving Directions is negatively correlated with both achievement and attitude almost across the board at the fifth grade level. The more directions a teacher gives, the less well the class, as a group, performs. A correlation coefficient does not imply causality; we might also hypothesize that the less well the class does, the more directions a teacher is likely to give. Giving a great many directions may be a sign that the class is not working at the correct level, that the pupils are not able to do the work on their own.

Asking General Questions, too, is negatively related to mathematics achievement and attitude toward mathematics at the fifth grade level. The more verbal behavior in the form of questioning (and in mathematics this would probably be in the form of asking children to recite answers) at the fifth grade level, the poorer the pupils' achievement and the more negative the pupils' attitude toward mathematics. If drill and poor achievement are related, one would hypothesize that the more covert the practice and the more individualized the instruction, the better the achievement. This result should be explored further. Asking Questions is positively related to gains in reading comprehension at the second grade level, however. The technique of questioning children about what they have read is a standard one for stimulating discussion which fosters comprehension. More research should be done to determine the nature and timing of questions which are most conducive to the development of reading comprehension skills.

Only one of the 12 Teacher Feedback event categories variables, Calling Attention to Error, is unrelated to any of the pupil growth measures. Simple Knowledge of Results during reading lessons is negatively related to reading comprehension at the fifth grade. The more pupils are told they are correct when they are, the less well they do on the measure of reading comprehension. Perhaps pupils improve in comprehension more in the fifth grade if they are given questions which do not involve right and wrong answers, but which tap pupil opinion and interpretation of reading material.

Asking a Child to Elaborate after he has responded seems to be related to reading comprehension at the second grade level. This technique and having a child talk more about his thoughts is evidently an effective one for raising achievement in reading comprehension.

Another teaching technique positively related to achievement in the second grade is using other pupils to give praise, encouragement and knowledge of results to children. Encouraging Other Pupils to Give Feedback is positively related to both reading and mathematics achievement, as well as attitude toward mathematics. At the fifth grade, however, having other pupils give feedback is negatively related to reading achievement. Having others respond to your answers or products during a reading lesson may be embarrassing and create a climate unconducive to learning.

Ignoring Positive or Mixed Achievement may be thought of in two ways. A teacher who ignores a pupil's achievement may be communicating a lack of interest in the product, creating an

unpleasant feeling in a pupil, or may be communicating a set of high standards and expectations which would stimulate a pupil onward. At the fifth grade, this variable is negatively related to attitude toward reading. Perhaps fifth graders interpret ignoring as disinterest. In the second grade ignoring was positively correlated with mathematics achievement. At the second grade, ignoring may be related to high expectations for the pupil. These explanations are worthy of testing in future investigations.

The variable Weak Acknowledgement of Achievement is a measure of how much a teacher reacts to a pupil achievement that is neither completely right nor wrong. Reacting to a mixed pupil response with some acknowledgement is positively correlated with achievement in both reading and mathematics for second graders. The younger pupils seem to profit from having a reactive, responsive teacher. This variable is negatively correlated with mathematics attitude in fifth grade pupils, however.

Encouraging a Pupil To Try Again is an important teacher behavior; if the pupil doesn't attempt a task again until he gets it correct, he will not learn. Trying Again is negatively related to mathematics achievement for second graders but is positively correlated with attitude. This paradoxical finding should be validated in future research.

How do teachers' reactions to non-academically oriented behavior related to achievement and pupil attitude? Praise for good behavior and Giving Warning for negative behavior has little or no effect on fifth grade pupils. Praise seems to have a positive

effect on second graders' reading attitude and mathematics computation skills. The more punishment the teacher gives, however, the poorer the pupils are apt to do in mathematics. It seems reasonable that the more disruptive the mathematics class, the less a pupil will learn of mathematics concepts. However, the more Warning, the more a teacher has only to remind children of consequences rather than punish them, the more mathematics learning takes place. The relation of classroom management and pupil achievement must be explored fully in any study of teacher competencies.

It is important to note that none of the event categories are significantly related to achievement or attitudes across both grade levels. Few of the event categories are related in the same way to both achievement and attitudes in a subject, and few are related in the same way to mathematics and reading. Teacher feedback behavior does not have universal effects. Rather, certain types of feedback have effects in certain situations and not in others. Any further research on feedback must take into account more carefully the context and appropriateness of the feedback behavior.

In the fifth grade, for example, none of the correlations between feedback behavior and the criterion variables are positive. The more feedback pupils are receiving in the fifth grade, the worse is their achievement and attitude. While feedback may assist second grade pupils, the presence of feedback in fifth grade classrooms seems either to alienate pupils or to be an indication that the pupils are not performing well. Pupils who are functioning well apparently do not need feedback at the fifth grade. When

children are being rewarded intrinsically by the materials and activities they are involved with, they are learning. When pupils are not achieving well, teachers may resort to more verbal, overt feedback attempting to influence learning.

All of the rating scale items are related to pupil achievement or attitude except Teacher Gestures. Teacher Movement is correlated with positive pupil attitude toward reading in second grade classrooms. To receive a high rating on this aspect of teacher variability, teachers usually move about the room, interacting with instructional materials by, for example, helping students act out stories.

Teacher Enthusiasm, ordinarily a powerful variable in research on teaching, is related only to attitude toward mathematics at the second grade. In this case, the more enthusiastic the teacher, the less favorable is the attitude toward mathematics.

The rating of Time Spent on Learning Activities is positively correlated with second grade attitude toward reading and mathematics achievement. The more time spent in learning in the second grade the better the children feel about reading and the more mathematics concepts they learn. Clearly attitude and achievement are related. When teachers give sufficient time for pupils to master materials and to succeed with them, the pupils learn and enjoy learning. A similar explanation may serve for the obtained relationship between fifth grade reading achievement and attitude and the rating of Lesson Learning Centered. Apparently fifth

graders needs task-orientation both to learn and to feel good about reading; when fifth grade reading lessons are focused on reading, progress occurs.

The rating of the extent to which Learning Activities are Differentiated for pupils, i.e., the amount of observed individualized instruction, is positively related to second grade mathematics attitude. The more teachers individualize instruction in mathematics at the scond grade, the more positively the pupils feel about the subject. Fifth grade pupils, however, seem to have a more negative attitude toward reading if there are differentiated reading assignments in their classrooms. At the fifth grade, pupils are much more aware of peer attitudes and those who find themselves assigned to material below grade level may feel insulted and discouraged about reading.

The technique of Delaying Naming a Child to answer a question after it has been asked seems to be an effective one in increasing reading comprehension at the fifth grade, although it does not create a positive attitude toward reading. At the second grade children are much more eager to be chosen and to volunteer, and are less fearful of failure so that this practice does not have a negative influence on these children.

Two important characteristics of successful counselors are Warmth and Honesty. Observers made judgments of these important global human characteristics displayed by the videotaped teachers. Although these are very general and somewhat diffuse traits, perhaps some of the methodology of research on counseling can be applied to research on teachers. The results of this exploratory

study indicate positive correlations between warmth and achievement in learning mathematics concepts at both grades, between honesty and achievement in mathematics computation at both grades, and between honesty and attitude toward mathematics at the fifth grade. Warm teachers do not threaten children and are accepting of children, and this disposition seems to have an effect on learning. Honest teachers give direct feedback, letting pupils know where they stand. Honest teachers do not give gratuitous praise, an attribute which older pupils may appreciate more than younger ones.

One of the goals of this year's phase of the BTES project was to generate hypotheses for further study. All of the significant results obtained and discussed in the report represent specific hypotheses to be tested, to be verified, in more controlled settings. In general, it is quite clear that teacher behaviors which are efficacious at one grade level are not necessarily effective at another grade level, and behaviors related to reading achievement and/or attitude do not necessarily have anything to do with behaviors related to mathematics achievement and/or attitude. For example, while Teacher Feedback categories correlated positively at the second grade, they correlated negatively at the fifth; while Asking General Questions was a Teacher Instruction behavior that was negatively related to mathematics, it was positively related to reading. Because teacher feedback is effective in the second grade and not at the fifth, perhaps social reinforcement from the teacher is much more important to second graders, and reinforcement from success at the activities

themselves is more important at the fifth grade. One might then predict that the teacher as a "person" is important to second graders, and the teacher as a "planner" or "leader" is important to fifth graders.

In summary, videotape recording does seem to have a place as a tool for studying teacher behavior. For some purposes, such as looking in detail at certain teacher behavior, the advantages of observation through videotapes do outweigh the disadvantages. No doubt this method will continue to be used in research studies of teacher behavior.

Historical Data on Pupil Performance

Another special project was the study of historical* pupil test data for Phase II participant teachers. The purpose of the study was to collect historical data on the reading and mathematics achievement of pupils in the classroom of the participating teachers in previous years, and to compare this historical data with data gathered through the administration of pupil outcome measures during Phase II. The staff collected available standardized achievement test data in reading and mathematics for students who were in the classroom of the BTES teachers during the 1971-72 and 1972-73 school year.

The only case where sufficient test data were available for comparision was in grade two reading achievement for the spring of

*Historical Data Study, Patricia Wheeler and Patricia Elias, Volume V, Chapter 3, Phase II Final Report.

1972 and spring of 1973. Twenty-four teachers in five districts were included in the spring 1973-spring 1974 comparisons. Comparisons were made between spring 1973-spring 1974, spring 1972-spring 1974, and spring 1972-spring 1973 mean scores. Spring 1972 test data were available for ten teachers in three districts.

For this hypotehsis-gathering phase, the focus of the stability substudy was to examine existing historical pupil achievement data and to determine whether those data could be used in conjunction with the project data collected in 1973-74 to evaluate the stability of teacher performance over a three-year period. Surprisingly little standardized achievement test data was routinely collected in basic academic areas in the second and fifth grade classrooms. Post-test or output information appeared to have been collected primarily when it was mandated by the California State Department of Education. It was not mandated at the fifth grade level. Pre-test or pupil input information was either not available or was inaccessible one or two years after having been collected. Any interpretations about the effectiveness of the teachers with their previous pupils or about the stability of impact of the teachers on pupil outcomes over a period of three years must be made with the understanding that the results are based on pupils of unknown aptitude and entry level skills.

Based on the data on reading achievement at the second grade level that were analyzed, correlations between the years of historical information about pupil performances suggested that the pupil performance of teachers tended to be stable over time.

However, when the data were organized in ways that began to reflect something about the characteristics of the pupil populations, the correlations suggested that year-to-year relationships among performances varied substantially by type of geographic location and by SES level of schools. It was not possible to tell from the types of information available whether these variations were due to pupil differences, teaching differences, or both, but it is reasonable to assume that the demographic indices represent pupil population differences to some extent. The analysis of the data utilizing fairly rough demographic indices of school characteristics as a proxy for pupil characteristics illustrated the fallacy in thinking about teaching performance in terms of the single available indicator of pupil outcomes. It is inappropriate to formulate any hypotheses about the stability of teaching performances over time in terms of historical information about pupil achievement.

A Videotape Test of Teachers' Diagnostic Skills

One of the special studies for Phase II of the Beginning Teacher Evaluation Study was to develop a videotaped test of teachers' skills in diagnosing the reading difficulties of children.* The test was a series of episodes in which children are depicted reading. Each child demonstrated some difficulty in

*Reading Difficulties: Videotape Test of Teachers' Diagnostic Skills, Patricia Elias and Gail Hare, Volume V, Chapter 4, Phase II Final Report.

performing a particular reading skill. The reading skills included were similar to those identified in the Phase II reading matrix and measured in the Phase II reading test battery for pupils. Second and fifth grade teachers were asked to diagnose each child's problem and to prescribe an appropriate strategy or strategies for correcting the problem.

Two types of content, word lists and paragraphs, were included in the test. Four presentations of each type of content were developed to represent with some fidelity the common types and proportional frequency of the errors identified in previous research. The test reflects our bias that elementary school teachers at all levels are challenged by the need to help children at all stages in their reading development, children whose skills range from the pre-primer level to fairly sophisticated levels of reading ability. Therefore, we concentrated on developing a single test which would begin to reflect the range of oral reading problems represented in elementary school classrooms.

To keep the content of the presentations as logically and psychometrically separate as possible, materials were developed which featured each type of criterion error in single filmed vignettes. Each word list was used to reflect a criterion decoding error; each paragraph was used to reflect a criterion comprehension-related error.

The printed materials teachers would use during the Diagnostic Film Test included three parts: Section One accompanied the films of children reading word lists; Section Two went with the reading

of the paragraphs; and, Section Three was to be presented with a replay of the fourth and fifth taped vignettes. The presentations were designed so that when teachers had viewed the eight reading sequences and responded to the open ended questions in Sections One and Two of the printed materials, those materials were collected. The videotape was then rewound to present the last of the word lists and the first of the paragraph reading film segments. Teachers were given Section Three and were asked to respond to written multiple choice or recognition format questions about the two presentations.

The objective for the Diagnostic Film Test, during this year of instrument development and the generation of hypotheses, was to pilot test the instrument on a sample of Phase II teachers. A sample of 35 teachers was chosen which included 18 at the second grade level and 17 at the fifth grade level. The Diagnostic Film test was administered to the selected sample of teachers as part of their spring testing battery.

The scoring standards applied were fairly rigorous. Teachers were required to indicate some understanding of the major difficulty depicted and to suggest some strategy or strategies for correcting that problem. Credit was also given for the identification of the minor problems depicted and their remediation strategies. It was not required that teachers respond in exact "reading specialist" terminology. For example, if a teacher indicated that a child was having problems with the sounds in the middle of words such as t or p, that was accepted as an equivalent response to the identification

of the child's problem as medial consonant errors. Acceptable responses were scored no matter where teachers happened to record them within each section of the test booklet.

The scores of teachers were organized to reflect scores on each part of the test, totals on various combinations, and the total test. One of the areas we wanted to explore was the relationship between teachers' responses to open ended questions and to close ended questions with a recognition format. The multiple choice format is the most frequently used convention in tests of diagnostic skills.

In general, the means of the second grade teachers were higher than those of the fifth grade teachers. On the free response decoding sections of the test in particular, the second grade teachers were more able to accurately diagnose and suggest strategies for remediation of oral reading problems than their fifth grade colleagues. The scores of the two groups on the open ended comprehension sections were more similar. The relatively better performance of teachers on the multiple choice questions, and the lack of correlational relationships with free responses tentatively suggest that performance may be different on the two types of test formats. Further research is warranted to test the effects of test format on teacher demonstrations of diagnostic skills. The research might include verification of test results in the classroom where, presumably, teaching performance is more dependent on the kind of recall which is assessed by the open ended questions.

Teacher performance on the Diagnostic Film Test was analytically related to teacher performance on other reading and reading related tests, observed teacher responses to pupils in their classrooms and to observed and measured pupil reading performances. Some of the hypotheses to be tested in other research were:

1. Second grade teachers were more skilled at diagnosing problems and suggesting strategies for the remediation of pupil decoding problems in oral reading than were fifth grade teachers.

2. Second and fifth grade teachers were about equally skilled at diagnosing problems and suggesting strategies for the remediation of pupil comprehension problems in oral reading.

3. Neither second nor fifth grade teachers did particularly well in generating diagnoses and remediation strategies using an absolute standard.

4. Diagnostic and remediation skills of fifth grade teachers were related to their knowledge about the teaching of reading and their ability to apply that knowledge.

5. More highly developed diagnostic skills for fifth grade teachers were associated with more positive attitudes toward the teaching of reading.

6. Teacher skills in the diagnosis of decoding problems in reading were associated with teacher knowledge about the teaching of mathematics at both grade levels.

7. Second grade teachers who were more frequently observed working with individual pupils during reading were the more skilled diagnosticians.

8. More highly developed diagnostic skills in second grade teachers were observationally associated with less of a tendency not to respond to individual pupils during reading activities.

9. Negative feedback to pupils during reading activities was more frequently observed in the second grade classrooms of teachers with greater skills in diagnosting pupil reading comprehension.

10. Positive feedback to pupils was observed more frequently during reading activities in the classrooms of diagnostically skilled fifth grade teachers.

11. Instances of positive pupil phonics skills and general reading skills were observed more frequently in the classroom of diagnostically skilled second grade teachers, but the same teacher skills were associated with poorer pupil comprehension skills.

12. Instances of positive pupil comprehension skills, oral reading skills and general reading skills were observed more frequently in the classrooms of diagnostically skilled fifth grade teachers.

13. Second grade pupil skill growth in literal and inferential comprehension reading tasks was negatively associated with teacher diagnostic skills.

14. Fifth grade pupil skill growth on literal and inferential reading tasks was negatively associated with teacher diagnostic skills.

15. Pupil reading skill growth on decoding tasks was not associated with the diagnostic skills of teachers.

The relationships between the demonstration of teacher skills on the test, the observed evidence of pupil skills in related reading tasks, and the observed patterns of teacher responses to individual pupils all suggest that the Diagnostic Film Test may be a type of instrument worthy of further research and development. The relatively poor performance of both second and fifth grade teachers on the comprehension sections of the Diagnostic Film Test, the poor observed comprehension task performance of second grade pupils of diagnostically skilled teachers, and the inverse relationship between diagnostic skills demonstrated on the test and pupil achievement on literal and inferential comprehension tasks all suggest further exploration of the teaching priorities and the diagnostic skills of elementary school teachers.

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BEGINNING TEACHER EVALUATION STUDY: PHASE II

FINAL REPORT: VOLUME I, APPENDIX A

CORRELATIONS AMONG THE BASIC COMPONENTS OF THE TEACHING PERFORMANCE VARIABLES AND THE PUPIL ACHIEVEMENT TESTS

BEGINNING TEACHER EVALUATION STUDY: FINAL REPORT

Volume I, Appendix A

CORRELATIONS AMONG THE BASIC COMPONENTS OF THE TEACHING PERFORMANCE VARIABLES AND THE PUPIL ACHIEVEMENT TESTS

List of Variables for Reading

Variable		Title
WORK DIARY		
WD-1	Teacher:	Preparation Time
WD-2		Teaching Time
WD-3		Time Teaching-Decoding
WD-4		Time Teaching-Vocabulary
WD-5		Time Teaching-Comprehension
WD-6		Time Teaching-Application
WD-7	Aide:	Preparation Time
WD-8		Actual Time
WD-9	Teacher:	Skills Taught-Decoding
WD-10		Skills Taught-Vocabulary
WD-11		Skills Taught-Comprehension
WD-12		Skills Taught-Application
WD-13		Skills Not Taught-Decoding
WD-14		Skills Not Taught-Vocabulary
WD-15		Skills Not Taught-Comprehension
WD-16		Skills Not Taught-Application
WD-17	Aide:	Skills Taught-Decoding
WD-18		Skills Taught-Vocabulary
WD-19		Skills Taught-Comprehension
WD-20		Skills Taught-Application
WD-21	Teacher:	Skills Introduced
WD-22		Skills Reviewed
WD-23		Class Organization-Simultaneous
WD-24		Class Organization Grouped by Reading Level
WD-25		Class Organization Grouped by Skill Needed
WD-26		Class Organization-Individualized
WD-27		Class Organization-Other
WD-28	Aide:	Class Organization-Individual
WD-29		Class Organized in Small Group
WD-30		Class Organized in Large Group
WD-31		Class Organized in Combination
WD-32	Teacher:	Percent of Pupils Taught by Teacher
WD-33		Percent of Adults per Pupil
WD-34		Number of Reading Materials Used

List of Variables for Reading (continued)

Variable	Title
RAMOS	
RAMOS 1	Percent Time Spent as Main Instructor
RAMOS 2	Percent Time Spent in Instruction, Assessment/Diagnosis and Evaluating
RAMOS 3	Percent Time Spent Facilitating, Discipline and Class Management
RAMOS 4	Percent Time Spent on Preparation and Supervision of Staff
RAMOS 5	Percent Time Spent in Independent
RAMOS 6	Percent Time Spent on New Concepts and New Facts
RAMOS 7	Percent Time Spent on Practice Facts and Practice Skill
RAMOS 8	Percent Time Spent on Reviewing Concepts, Reviewing Skills, and Reviewing Facts
RAMOS 9	Main Material: Percent Times Spent on Book, Workbook, Paper/Pencil
RAMOS 10	Main Material: Percent Times Spent on Chart/Blackboard and Equipment
RAMOS 11	Second Material: Percent Times Spent on Book, Workbook, Paper/Pencil
RAMOS 12	Second Material: Percent Times Spent on Chart/Blackboard and Equipment
RAMOS 13	Percent Time-Lecture
RAMOS 14	Percent Time-Discussion
RAMOS 15	Percent Time-Seatwork
RAMOS 16	Percent Time-Recital
RAMOS 17	Percent Time-Question/Answer
RAMOS 18	Percent Time-Audio-Visual
RAMOS 19	Percent Time-Game
RAMOS 20	Percent Time-Visual Demonstration
APPLE	Pupil Events
APPLE 1	+Academic Performance
APPLE 2	+Attentiveness
APPLE 3	+Direction Following
APPLE 4	+Engagement
APPLE 5	+Participation
APPLE 6	+Volunteering
APPLE 7	+Work Habits
APPLE 8	-Conduct
APPLE 9	-Inattention
APPLE 10	-Talking

List of Variables for Reading (continued)

Variable	Title
APPLE	Pupil Events
APPLE 11	0 Conduct
APPLE 12	0 Engagement
APPLE 13	0 Inattention
APPLE 14	0 Work Habits
APPLE 15	+Oral Reading
APPLE 16	+Phonic Skills
APPLE 17	+Reading Comprehension
APPLE 19	Independent-Class
APPLE 20	Independent-Group
APPLE 21	Independent-Individual
APPLE 22	Teacher-Class
APPLE 23	Teacher-Group
	Activities
APPLE 24	Academic Organizing
APPLE 25	Answering
APPLE 26	Asking
APPLE 27	At Desk
APPLE 28	At Board
APPLE 29	Checking
APPLE 30	Circulating
APPLE 31	Discussion
APPLE 32	Explaining
APPLE 33	Helping
APPLE 34	Instruction Giving
APPLE 35	Listening
APPLE 36	Question and Answer
APPLE 37	Supervising
APPLE 38	Working With
	Responses
APPLE 39	Instructing
APPLE 40	Disciplining
APPLE 41	Teacher Help
APPLE 42	Ignoring
APPLE 43	Moves on
APPLE 44	Negative Feedback
APPLE 45	None
APPLE 46	Positive Feedback
APPLE 47	Praise

List of Variables for Reading (continued)

Variable	Title
APPLE	Responses
APPLE 48	Questioning
APPLE 49	Recognizing
APPLE 50	Redirecting
PUPIL ACHIEVEMENT TESTS	
CATRC-GN	CAT Reading Comprehension Gain
RAPPL-GN	Reading Application Gain
DECOD-GN	Decoding Gain
RACH.-GN	Reading Achievement Gain
TOTRD-GN	Total Reading Gain

APPENDIX A

List of Variables for Mathematics

Variable		Title
WORK DIARY		
WD-1	Teacher:	Preparation Time
WD-2		Time Spent Teaching
WD-3		Time Teaching Problem Types
WD-4		Time Teaching Operations
WD-5		Time Teaching Special Skills
WD-6	Aide:	Preparation Time
WD-7		Actual Time
WD-8	Teacher:	Skills Taught-Problem Types
WD-9		Skills Taught-Operations
WD-10		Skills Taught-Special Skills
WD-11		Skills Not Taught-Problem Types
WD-12		Skills Not Taught-Operations
WD-13		Skills Not Taught-Special Skills
WD-14	Aide:	Skills Taught-Problem Types
WD-15		Skills Taught-Operations
WD-16		Skills Taught-Special Skills
WD-17	Teacher:	Skills Introduction
WD-18		Skills Reviewed
WD-19		Class Organization-Simultaneous
WD-20		Class Organization-Reading Level-Group
WD-21		Class Organization-Skill Need-Group
WD-22		Class Organization-Individualized
WD-23		Class Organization-Other
WD-24	Aide:	Class Organization-Individual
WD-25		Class Organization-Small Groups
WD-26		Class Organization-Large Groups
WD-27		Class Organization-Combination
WD-28	Teacher:	Percent of Pupils Taught by Teacher
WD-29		Percent of Adults per Pupils
WD-30		Number of Math Materials Used
RAMOS		
RAMOS 1		Percent Time Spent as Main Instructor
RAMOS 2		Percent Time Spent in Instruction, Assessment/Diagnosis and Evaluating
RAMOS 3		Percent Time Spent Facilitating, Discipline and Class Management

List of Variables for Mathematics (continued)

Variable	Title
RAMOS	
RAMOS 4	Percent Time Spent on Preparation and Supervision of Staff
RAMOS 5	Percent Time Spent in Independent
RAMOS 6	Percent Time Spent on New Concepts and New Facts
RAMOS 7	Percent Time Spent on Practice Facts and Practice Skill
RAMOS 8	Percent Time Spent on Reviewing Concepts, Reviewing Skills and Reviewing Facts
RAMOS 9	Main Material: Percent Times Spent on Book, Workbook, Paper/Pencil
RAMOS 1C	Main Material: Percent Times Spent on Chart/Blackboard and Equipment
RAMOS 11	Second Material: Percent Times Spent on Book, Workbook, Paper/Pencil
RAMOS 12	Second Material: Percent Times Spent on Chart/Blackboard and Equipment
RAMOS 13	Percent Time-Lecture
RAMOS 14	Percent Time-Discussion
RAMOS 15	Percent Time-Seatwork
RAMOS 16	Percent Time-Recital
RAMOS 17	Percent Time-Question/Answer
RAMOS 18	Percent Time-Audio-Visual
RAMOS 19	Percent Time-Game
RAMOS 20	Percent Time-Visual Demonstration
APPLE	Pupil Events
APPLE 1	+Academic Performance
APPLE 2	+Attentiveness
APPLE 3	+Direction Following
APPLE 4	+Engagement
APPLE 5	+Participation
APPLE 6	+Volunteering
APPLE 7	+Work Habits
APPLE 8	-Conduct
APPLE 9	-Inattention
APPLE 10	-Talking
APPLE 11	0 Conduct
APPLE 12	0 Engagement
APPLE 13	0 Inattention
APPLE 14	0 Work Habits

List of Variables for Mathematics (continued)

Variable	Title
APPLE	Pupil Events
APPLE 15	+Number Concepts
APPLE 16	0 Number Concepts
APPLE 17	-Number Concepts
APPLE 19	Independent-Class
APPLE 20	Independent-Group
APPLE 21	Independent-Individual
APPLE 22	Teacher-Class
APPLE 23	Teacher-Group
	Activities
APPLE 24	Academic Organizing
APPLE 25	Answering
APPLE 26	Asking
APPLE 27	At Desk
APPLE 28	At Board
APPLE 29	Checking
APPLE 30	Circulating
APPLE 31	Discussion
APPLE 32	Explaining
APPLE 33	Helping
APPLE 34	Instruction Giving
APPLE 35	Listening
APPLE 36	Question and Answer
APPLE 37	Supervising
APPLE 38	Working With
APPLE 39	Instructing
	Responses
APPLE 40	Disciplining
APPLE 41	Teacher Help
APPLE 42	Ignoring
APPLE 43	Moves on
APPLE 44	Negative Feedback
APPLE 45	None
APPLE 46	Positive Feedback
APPLE 47	Praise
APPLE 48	Questioning
APPLE 49	Recognizing
APPLE 50	Redirecting

List of Variables for Mathematics (continued)

Variable	Title
PUPIL ACHIEVEMENT TESTS	
CATCN-GN	CAT Mathematics Concepts Gain
CATCM-GN	CAT Mathematics Computations Gain
MTHAP-GN	CAT Mathematics Application Gain
TOTMA-GN	Total Mathematics Gain

Correlations Among the Basic Components of the Teaching Performance Variables and the Pupil Achievement Tests
Grade 2 Reading
(N = 42)

PTES GRADE 2 READING

	WD-----1	WD-----2	WD-----3	WD-----4	WD-----5	WD-----6	WD-----7	WD-----8	WD-----9	WD----10
WD-----1	1.0000	-0.0260	0.0341	0.2305	0.0649	0.3183	0.0882	-0.1240	-0.0013	-0.1644
WD-----2	-0.0260	1.0000	-0.3900	0.0606	0.1991	0.0350	-0.2933	-0.4014	0.1057	0.1701
WD-----3	0.0341	-0.3900	1.0000	0.0713	0.3196	0.1573	0.1851	0.5364	-0.0772	0.0392
WD-----4	0.2305	0.0606	0.0713	1.0000	0.3811	0.1538	-0.1112	-0.0282	0.0969	-0.0259
WD-----5	0.0649	0.1991	0.3196	0.3811	1.0000	0.5292	-0.1823	-0.0810	-0.0544	-0.0355
WD-----6	0.3183	0.0350	0.1573	0.1538	0.5292	1.0000	-0.2131	-0.0399	0.1523	-0.1316
WD-----7	0.0882	-0.2933	0.1851	-0.1112	-0.1823	-0.2131	1.0000	0.5124	-0.5344	-0.4788
WD-----8	-0.1240	-0.4014	0.5364	-0.0282	-0.0810	-0.0399	0.5124	1.0000	-0.3039	-0.2639
WD-----9	-0.0013	0.1057	-0.0772	0.0969	-0.0544	0.1523	-0.5344	-0.3039	1.0000	0.6831
WD----10	-0.1644	0.1701	0.0392	-0.0259	-0.0355	-0.1316	-0.4788	-0.2639	0.6831	1.0000
WD----11	-0.0553	0.1532	0.0318	-0.0348	-0.0182	0.1206	-0.4336	-0.1769	0.6038	0.5429
WD----12	0.0730	0.2785	-0.1355	0.0926	-0.1010	0.0949	-0.4987	-0.3920	0.7071	0.6546
WD----13	-0.0808	-0.1124	0.0810	0.0660	-0.0567	-0.2118	0.0508	0.0611	-0.1271	0.1628
WD----14	0.3300	0.0291	0.2080	-0.1094	0.1237	0.0404	-0.0497	-0.0982	0.1508	0.2347
WD----15	0.1949	-0.3167	0.1551	-0.1787	-0.1923	-0.1981	0.3291	0.0758	-0.0579	0.0879
WD----16	0.1245	-0.0518	-0.2123	-0.1157	-0.1643	-0.1618	0.2667	-0.0444	-0.2690	0.0057
WD----17	-0.3042	-0.1033	0.3172	-0.1652	-0.0279	-0.1773	0.3974	0.6578	-0.2544	-0.0289
WD----18	-0.0126	-0.2129	0.3546	-0.0306	0.1375	0.0495	0.2687	0.5839	-0.1320	-0.0187
WD----19	-0.1521	-0.2034	0.3311	-0.1028	-0.0780	-0.1968	0.4605	0.7181	-0.3606	-0.1848
WD----20	-0.1952	-0.3637	0.4230	-0.0915	0.0206	-0.0027	0.1526	0.6049	-0.0993	-0.0504
WD----21	-0.1500	-0.1172	0.1829	-0.1236	0.0957	0.2138	0.1064	0.0682	0.0158	-0.0741
WD----22	-0.1404	-0.2627	0.2587	-0.1248	0.1544	0.1981	0.1056	0.2325	-0.0836	-0.2437
WD----23	-0.0991	-0.0333	0.1933	0.1425	-0.0894	-0.1829	0.2348	0.2628	0.0913	0.0467
WD----24	-0.2824	-0.1087	-0.0689	-0.0502	0.0291	-0.1459	-0.0752	-0.2928	-0.0925	-0.0256
WD----25	0.0731	0.2841	-0.0852	0.0228	-0.0397	-0.1035	-0.0072	-0.0113	0.1180	0.1120
WD----26	0.0181	0.1734	-0.0082	0.0301	-0.0580	-0.0541	-0.0560	-0.0168	-0.0258	0.1120
WD----27	0.3970	-0.0224	0.0378	0.0052	0.1873	0.4523	-0.0083	-0.0076	0.0874	-0.2480
WD----28	-0.2106	-0.2203	0.2003	-0.0135	0.0413	-0.0752	0.1683	0.5765	-0.1313	0.0070
WD----29	-0.1242	-0.3432	0.3540	-0.0407	-0.1149	-0.3014	0.5265	0.7235	-0.2201	-0.2058
WD----30	-0.2411	-0.0570	0.3016	0.0590	-0.1315	-0.1805	0.1296	0.6135	0.0269	-0.0093
WD----31	-0.0821	-0.1921	0.3468	-0.0024	-0.0311	-0.1403	0.4487	0.7103	-0.3795	-0.2006
WD----32	0.1197	0.2074	-0.1008	0.1209	-0.0223	0.0695	-0.1163	-0.3473	0.1028	-0.0913
WD----33	-0.3815	-0.3304	-0.0689	-0.1960	-0.2226	-0.3193	0.0982	0.4273	-0.0747	-0.0185
WD----34	0.0189	-0.1069	0.2566	-0.0580	0.1287	0.3363	-0.1432	0.2267	0.1855	0.2065

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Grade 2 Reading (continued)

	WD-----1	WD-----2	WD-----3	WD-----4	WD-----5	WD-----6	WD-----7	WD-----8	WD-----9	WD----10
RAMOS--1	0.0564	-0.0522	-0.0203	0.2620	-0.1345	0.0346	0.1576	0.2673	0.0129	-0.0092
RAMOS--2	0.0185	-0.0506	-0.0378	0.1863	-0.0526	0.0466	0.2117	0.1986	-0.0879	-0.0454
RAMOS--3	0.1058	0.0112	0.1189	0.1611	-0.0528	0.0772	-0.0890	0.1540	0.1156	-0.0078
RAMOS--4	0.0268	-0.2394	-0.1817	-0.0465	-0.2263	-0.2698	0.1726	-0.0947	0.1656	0.1690
RAMOS--5	-0.1703	0.1541	-0.1542	-0.0996	-0.0641	-0.0914	-0.1078	-0.0043	0.0147	0.0779
RAMOS--6	0.1292	0.0392	0.0522	0.0379	-0.0413	-0.0192	0.0690	0.1359	-0.1003	0.0074
RAMOS--7	-0.1623	0.0261	0.1646	-0.1789	0.0106	0.0282	0.0287	0.0203	0.2812	0.1700
RAMOS--8	-0.0712	0.0246	-0.2604	0.1086	-0.1911	-0.2443	0.1580	0.1280	-0.0661	0.0384
RAMOS--9	-0.1689	0.0414	-0.2329	0.1630	-0.1744	-0.1741	0.0505	-0.0016	0.1073	0.0529
RAMOS-10	0.0734	-0.1099	0.3525	0.0234	0.0359	0.0722	0.0835	0.0964	0.0200	-0.0445
RAMOS-11	0.0585	0.0396	-0.0064	-0.2675	-0.0964	0.0377	-0.0474	-0.1894	0.0839	-0.0245
RAMOS-12	0.0246	-0.1018	-0.1271	0.0675	-0.0697	-0.1674	0.0990	-0.1397	0.0330	0.0834
RAMOS-13	-0.0013	0.1237	0.0933	-0.0062	0.1201	0.1896	-0.0686	-0.1385	0.2689	0.1592
RAMOS-14	0.0966	-0.0934	0.3957	0.1390	0.0586	-0.1105	0.0259	0.1821	0.0656	-0.0164
RAMOS-15	-0.0733	-0.0223	-0.1035	-0.0332	-0.0843	0.0023	0.2460	0.1749	0.0093	-0.0073
RAMOS-16	-0.0368	0.1509	-0.0352	0.0247	0.1323	0.1714	-0.2323	-0.2129	0.1840	0.0704
RAMOS-17	-0.0545	0.1406	-0.0927	0.3924	-0.0503	-0.0168	-0.0970	-0.1739	0.0357	0.0713
RAMOS-18	-0.0769	-0.2214	-0.1525	-0.0767	-0.1413	-0.1248	-0.0087	0.0492	-0.0374	-0.0414
RAMOS-19	0.1994	-0.0605	-0.0707	0.1973	0.2392	-0.0781	-0.0808	-0.1031	-0.0642	-0.1070
RAMOS-20	-0.1125	-0.2709	0.3380	0.0217	-0.0169	0.0973	0.0082	0.0872	0.1526	0.0331

	WD-----1	WD-----2	WD-----3	WD-----4	WD-----5	WD-----6	WD-----7	WD-----8	WD-----9	WD----10
APPLE--1	0.1268	-0.0777	0.2339	0.0630	0.1671	0.0695	-0.1479	-0.1577	-0.0886	-0.0569
APPLE--2	-0.1395	0.0752	0.0794	0.1687	0.1483	0.1761	0.1487	0.0943	-0.2043	-0.2112
APPLE--3	0.4104	0.3497	-0.1076	0.0659	-0.0431	-0.0928	-0.0813	-0.3427	0.1733	0.2141
APPLE--4	0.0495	-0.1191	-0.1078	-0.0333	-0.2355	-0.0582	0.3188	0.0273	-0.1936	-0.2439
APPLE--5	0.2021	0.2285	-0.2096	0.1464	-0.0559	0.0169	-0.2564	-0.2477	0.0943	0.1028
APPLE--6	-0.2287	0.1735	-0.0353	-0.1349	-0.0989	-0.3010	-0.0625	-0.1987	-0.1665	0.0630
APPLE--7	0.1719	0.0234	-0.1004	0.2859	0.0888	-0.1480	-0.0417	-0.0588	0.1193	0.1227
APPLE--8	-0.1078	-0.2089	0.0244	-0.0121	0.0015	0.0327	-0.1491	0.0510	0.1048	0.1499
APPLE--9	0.1079	-0.0184	0.1781	-0.0835	-0.1445	-0.1958	0.0376	0.3342	-0.0327	-0.0718
APPLE-10	0.3785	-0.0435	0.1982	0.1512	0.1920	0.0698	0.1367	0.2232	-0.3192	-0.4569
APPLE-11	0.2145	-0.0348	0.0882	0.0617	0.0919	0.0595	0.0900	0.0095	0.1358	-0.0526
APPLE-12	-0.1298	0.2061	-0.1790	-0.1841	0.0991	0.0026	-0.0849	0.0005	-0.2274	0.0497
APPLE-13	-0.0824	-0.0775	-0.0465	-0.0706	-0.1034	-0.0325	-0.0407	0.0407	-0.0679	0.0118
APPLE-14	0.0399	-0.0788	-0.2238	-0.1731	0.0189	-0.0925	-0.0125	0.0066	-0.2337	-0.1545
APPLE-15	-0.0857	0.3043	-0.2051	-0.0968	-0.0640	0.2444	-0.1391	-0.2926	0.1810	0.0990
APPLE-16	-0.0131	-0.2794	0.1850	0.1571	-0.1714	0.0581	0.0102	0.1687	0.1973	0.0256
APPLE-17	-0.1324	0.1013	-0.1675	0.0042	-0.0446	-0.1565	-0.0326	-0.1968	0.0976	0.1098
APPLE-19	0.0454	-0.1542	0.0603	-0.0614	-0.0774	-0.1673	0.0824	0.1241	-0.1060	0.2693
APPLE-20	0.0397	0.1677	-0.2687	0.0228	-0.0299	-0.1122	-0.0810	-0.2484	0.0245	-0.0893
APPLE-21	0.4791	-0.1833	-0.0124	0.0897	-0.0024	0.3308	0.0136	-0.0194	-0.1477	-0.3125
APPLE-22	-0.1059	-0.2405	0.3791	0.0944	-0.0645	-0.0408	0.1511	0.4211	0.1020	0.1021
APPLE-23	0.0042	0.1789	-0.3498	-0.0172	-0.1473	-0.0860	-0.1171	-0.5008	0.2004	0.1411
APPLE-24	0.2151	0.0201	-0.2445	-0.1511	-0.2443	-0.4140	0.1950	-0.2485	0.1204	0.1408
APPLE-25	-0.0491	-0.1914	0.2778	0.0061	-0.0074	-0.1433	-0.1485	-0.0528	0.1113	0.1615
APPLE-26	-0.1660	0.1010	0.0085	-0.1757	0.0739	-0.0955	-0.1581	-0.3516	0.0702	0.0778
APPLE-27	0.0370	0.1576	0.2217	0.1318	0.0930	-0.0128	0.1897	0.3550	-0.1500	-0.1921
APPLE-28	-0.0714	0.0900	0.1581	0.0991	0.0288	-0.0545	0.1809	0.3929	-0.2613	-0.2515
APPLE-29	0.0318	-0.0194	-0.1226	-0.1419	-0.1665	0.0821	-0.0338	-0.1680	0.0931	0.0845
APPLE-30	0.5179	-0.1794	0.1166	0.1976	0.0888	0.2814	0.1833	0.1656	-0.1878	-0.2950

Grade 2 Reading (continued)

	WD-----1	WD-----2	WD-----3	WD-----4	WD-----5	WD-----6	WD-----7	WD-----8	WD-----9	WD----10
APPLE-31	-0.0759	0.1558	0.1946	-0.1236	0.2212	0.0571	0.1439	-0.0635	-0.2997	-0.2688
APPLE-32	0.0670	0.0349	-0.0293	0.2628	0.3579	0.2503	0.0824	-0.1068	-0.1505	-0.3540
APPLE-33	-0.1081	-0.2202	-0.1064	-0.1709	-0.2031	-0.2065	-0.0542	0.2261	-0.1062	0.0917
APPLE-34	0.0953	0.1429	0.0703	-0.0117	0.2316	0.0330	-0.0927	-0.2040	0.0526	0.0891
APPLE-35	0.1378	0.3893	-0.1741	-0.0280	0.0691	0.0790	-0.0759	-0.2459	0.1763	0.2256
APPLE-36	0.0430	0.0885	-0.1874	0.3125	-0.1865	-0.1991	-0.0031	-0.1438	0.1164	0.3015
APPLE-37	0.0737	0.2345	0.0565	0.0745	0.0094	-0.0779	0.1114	0.2721	-0.2190	-0.2846
APPLE-38	-0.1406	-0.0234	-0.0692	-0.0409	-0.3719	-0.2771	-0.0417	-0.0495	0.3914	0.1283
APPLE-39	0.1120	0.0974	-0.1170	0.2597	-0.0594	0.1609	-0.2390	-0.1358	0.2084	0.0960
APPLE-40	-0.0264	0.0056	0.2757	-0.0116	0.1053	0.1755	-0.0555	0.0559	0.3422	0.3290
APPLE-41	0.2053	0.0750	0.0538	0.0381	-0.0632	-0.0451	0.1810	0.2981	-0.0771	-0.0217
APPLE-42	0.3108	0.0271	0.0975	0.0703	0.0633	0.2800	-0.1270	-0.0913	0.0950	0.0992
APPLE-43	-0.2569	0.2404	0.1553	-0.0918	0.0844	-0.1334	-0.1388	-0.2050	0.0152	-0.0098
APPLE-44	-0.0987	-0.1035	0.0761	0.3184	0.2393	0.1286	-0.1466	-0.1627	0.1945	0.0940
APPLE-45	0.0632	-0.0889	-0.1490	0.0633	-0.2607	-0.3649	0.2824	0.2246	-0.3448	-0.3222
APPLE-46	-0.0368	0.1251	-0.3078	0.1819	-0.2495	-0.3230	-0.1682	-0.4502	0.1456	0.1260
APPLE-47	0.0549	0.0288	0.0244	-0.1726	0.1157	0.1869	0.0169	0.0192	-0.0123	0.0522
APPLE-48	-0.1782	0.2373	-0.0062	-0.1587	0.0991	0.1230	-0.1903	-0.1911	0.0814	0.0639
APPLE-49	-0.0619	0.2499	0.0103	-0.2767	0.0213	-0.1454	-0.0367	-0.2118	-0.3565	-0.1571
APPLE-50	-0.2068	-0.0464	0.3895	-0.2352	-0.0092	0.0038	-0.1425	0.0668	-0.0150	0.1868
CATRC-GN	0.0354	-0.1104	-0.0070	-0.0040	-0.1312	0.0261	-0.1683	-0.1844	0.1249	0.0501
RAPPL-GN	0.0393	-0.2622	0.2936	-0.0853	-0.0551	-0.0015	-0.0278	-0.0472	0.1814	0.1314
DECOD-GN	-0.0583	0.0305	0.1831	0.2177	0.1167	-0.1352	0.0073	0.0017	0.1693	0.0609
RACH.-GN	0.1057	-0.1338	0.0771	0.0389	-0.1295	0.0320	-0.0697	-0.0470	0.2700	0.1876
TOTRC-GN	0.1901	-0.2622	0.2215	-0.0731	-0.1250	0.0646	-0.0646	-0.1974	0.2511	0.1850

	WD----11	WD----12	WD----13	WD----14	WD----15	WD----16	WC----17	WD----18	WD----19	WD----20
WD-----1	-0.0553	0.0730	-0.0808	0.3300	0.1949	0.1245	-0.3042	-0.0126	-0.1521	-0.1952
WC-----2	0.1532	0.2785	-0.1124	0.0291	-0.3167	-0.0518	-0.1033	-0.2129	-0.2034	-0.3637
WC-----3	0.0318	-0.1355	0.0810	0.2080	0.1551	-0.2123	0.3172	0.3546	0.3311	0.4230
WD-----4	-0.0348	0.0926	0.0660	-0.1094	-0.1787	-0.1157	-0.1652	-0.0306	-0.1028	-0.0315
WD-----5	-0.0182	-0.1010	-0.0567	0.1237	-0.1923	-0.1643	-0.0279	0.1375	-0.0780	0.0206
WC-----6	0.1206	0.0949	-0.2118	0.0404	-0.1981	-0.1618	-0.1773	0.0495	-0.1968	-0.0027
WC-----7	-0.4336	-0.4987	0.0508	-0.0497	0.3291	0.2667	0.3974	0.2687	0.4605	0.1526
WD-----8	-0.1769	-0.3920	0.0611	-0.0982	0.0758	-0.0444	0.6578	0.5839	0.7181	0.6049
WD-----9	0.6038	0.7071	-0.1271	0.1508	-0.0579	-0.2690	-0.2544	-0.1320	-0.3606	-0.0993
WC----10	0.5429	0.6546	0.1628	0.2347	0.0879	0.0057	-0.0289	-0.0187	-0.1848	-0.0504
WC----11	1.0000	0.6556	-0.0178	0.2690	-0.2735	-0.3412	-0.0263	-0.1136	-0.1245	0.0577
WC----12	0.6556	1.0000	-0.1396	0.0873	-0.0620	-0.1022	-0.1654	-0.1718	-0.2614	-0.1274
WC----13	-0.0178	-0.1396	1.0000	0.5108	0.2756	0.3537	0.2292	-0.0493	0.2326	0.1895
WD----14	0.2690	0.0873	0.5108	1.0000	0.4174	0.2247	0.0693	-0.0520	0.0658	0.0917
WD----15	-0.2735	-0.0620	0.2756	0.4174	1.0000	0.6463	0.2120	0.0281	0.2118	0.2014
WD----16	-0.3412	-0.1022	0.3537	0.2247	0.6463	1.0000	0.1734	-0.1090	0.1577	0.0373
WC----17	-0.0263	-0.1654	0.2292	0.0693	0.2120	0.1734	1.0000	0.6196	0.8491	0.5859
WD----18	-0.1136	-0.1718	-0.0493	-0.0520	0.0281	-0.1090	0.6196	1.0000	0.6209	0.4042
WC----19	-0.1245	-0.2614	0.2326	0.0658	0.2118	0.1572	0.8491	0.6209	1.0000	0.6270
WC----20	0.0577	-0.1274	0.1895	0.0917	0.2014	0.0373	0.5859	0.4042	0.6270	1.0000
WD----21	0.1916	-0.0294	0.0123	-0.0917	-0.0331	-0.0901	0.1654	0.0343	0.1174	0.0366
WD----22	-0.0146	-0.1701	-0.0155	-0.2256	-0.2127	-0.3101	0.1513	0.2839	0.2437	0.1448
WC----23	-0.3121	-0.0823	-0.1752	-0.1231	0.2045	0.1499	0.0932	0.1499	0.0898	0.1142
WD----24	-0.2410	-0.3409	0.3455	0.0607	0.1946	0.1723	-0.1839	-0.2689	-0.3611	-0.2253
WC----25	-0.2032	0.1423	0.0056	0.1995	0.3041	0.3436	0.2188	0.0420	0.2127	-0.0192
WC----26	0.1918	0.2312	0.0056	0.0000	-0.0969	-0.0958	0.0833	-0.1625	0.1455	0.2532
WC----27	-0.0420	0.1125	-0.0352	0.2103	0.0551	-0.0312	-0.2418	0.0298	-0.0296	-0.0101
WC----28	-0.1335	-0.1293	0.0273	-0.1267	0.0152	0.0683	0.4935	0.5502	0.5356	0.6358
WD----29	-0.1574	-0.2538	-0.0411	-0.1317	0.2585	0.0032	0.6214	0.5227	0.7660	0.5399
WC----30	0.0608	0.0964	-0.1919	-0.1457	-0.0899	-0.1156	0.4627	0.3297	0.4530	0.2834
WC----31	-0.2129	-0.2210	-0.0238	-0.2383	-0.0436	0.0248	0.6403	0.5962	0.7635	0.3275
WC----32	-0.2483	-0.0580	0.0495	0.0418	0.0439	0.2608	-0.3496	-0.3983	-0.3096	-0.3899
WD----33	-0.0400	-0.1752	0.0236	-0.1243	0.0213	-0.0257	0.3843	0.2509	0.3280	0.4208
WC----34	0.1424	0.2412	-0.0379	0.0340	-0.1321	-0.0996	0.1256	0.3153	0.0562	0.0098

Grade 2 Reading (continued)

	WD----11	WD----12	WD----13	WD----14	WD----15	WD----16	WD----17	WD----18	WD----19	WD----20
RAMOS--1	0.0052	-0.0041	-0.1221	-0.1828	0.0576	-0.1624	0.2707	0.3503	0.2871	0.0266
RAMOS--2	0.1299	-0.0061	-0.1099	-0.1025	0.0955	-0.0407	0.2105	0.1711	0.1872	0.1564
RAMOS--3	-0.0950	-0.0675	-0.0243	-0.1330	-0.1650	-0.2962	0.0016	0.1822	0.0688	-0.1318
RAMOS--4	-0.3794	0.0942	-0.0938	-0.0427	0.4358	0.2797	-0.0062	0.2084	0.0131	-0.1632
RAMOS--5	-0.0261	0.1648	0.0709	0.0096	-0.0090	0.0681	0.4085	0.2689	0.3820	-0.1143
RAMOS--6	0.1126	0.0448	-0.0428	-0.1588	-0.0499	0.0908	0.1225	0.2028	0.1230	0.1058
RAMOS--7	-0.0289	0.0593	-0.1898	0.0156	0.2259	-0.2122	0.0575	0.1400	-0.0210	-0.0218
RAMOS--8	0.1294	0.0020	0.1905	0.1368	-0.0683	0.1532	0.3252	0.2487	0.3190	-0.0616
RAMOS--9	0.0803	0.0662	0.0943	-0.0214	0.1067	-0.0038	0.1419	0.1796	0.1315	-0.1107
RAMOS-10	0.0524	0.0111	0.0265	-0.0480	-0.0688	0.1252	0.0141	0.0195	0.0467	-0.0849
RAMOS-11	0.0713	-0.0484	0.0036	0.1013	-0.0441	-0.1504	-0.1922	-0.2097	-0.2237	-0.4002
RAMOS-12	0.0673	0.1217	-0.0232	-0.1360	-0.0623	0.0473	0.0808	0.2488	0.1277	-0.1428
RAMOS-13	0.0757	0.0614	-0.0835	0.1903	-0.0184	-0.1932	-0.0463	-0.0487	-0.2584	-0.1098
RAMOS-14	0.0176	-0.0060	-0.0228	0.0179	-0.0786	-0.2290	0.0692	0.1456	0.1207	0.1150
RAMOS-15	-0.1831	-0.0388	0.2614	0.1279	0.4065	0.1604	0.3375	0.2718	0.3108	0.1214
RAMOS-16	0.1504	0.1548	-0.2401	0.0245	-0.0436	-0.0744	-0.1617	-0.1915	-0.1833	-0.1851
RAMOS-17	0.0668	0.1127	0.0776	-0.1333	-0.2254	-0.0939	0.0122	0.0333	-0.0261	-0.2264
RAMOS-18	0.2265	-0.0721	-0.0529	-0.1109	-0.1420	0.0379	0.0142	0.1294	0.0117	-0.0069
RAMOS-19	-0.2158	-0.1324	-0.0297	-0.0093	0.1138	0.1305	-0.2371	-0.1792	-0.2006	-0.1100
RAMOS-20	0.2243	0.1221	0.0061	-0.1005	-0.0926	0.1512	-0.0077	0.0486	-0.0098	0.0090

Grade 2 Reading (continued)

	WD----11	WD----12	WD----13	WD----14	WD----15	WD----16	WD----17	WD----18	WD----19	WD----20
APPLE--1	-0.1054	-0.2687	0.1997	0.2927	0.0367	0.0472	-0.3018	-0.1955	-0.2316	-0.1030
APPLE--2	0.0562	-0.0856	0.1445	0.0246	-0.1158	-0.0094	0.0197	-0.1775	0.0555	0.0939
APPLE--3	0.1913	0.4030	0.1197	0.3180	0.1817	0.1976	-0.1788	-0.1299	-0.2265	-0.1928
APPLE--4	-0.0843	-0.0033	-0.0231	-0.1162	0.1929	0.1370	0.1264	-0.1080	0.2893	0.1018
APPLE--5	0.0363	0.1199	0.2002	0.2051	0.0300	0.1754	-0.1872	-0.1869	-0.2018	-0.2569
APPLE--6	-0.0492	0.0223	0.2514	0.2786	0.0643	0.2148	0.0261	-0.0596	-0.0136	-0.0494
APPLE--7	0.0359	0.0711	0.0469	-0.2047	-0.0849	-0.1368	-0.1297	0.1033	-0.0205	-0.0143
APPLE--8	0.2521	0.0248	0.0495	0.0237	0.0507	0.0882	-0.0204	-0.0423	-0.0251	-0.0336
APPLE--9	-0.0566	-0.0689	0.0939	0.2709	0.2600	0.2333	0.3861	0.0748	0.3998	0.3506
APPLE-10	-0.3228	-0.3639	-0.1929	0.0533	-0.0409	-0.0469	-0.0842	0.1998	0.1277	0.0244
APPLE-11	0.0695	-0.0622	-0.1032	0.3567	0.0086	-0.1692	-0.0974	0.0657	-0.0359	-0.2408
APPLE-12	-0.2292	-0.2949	0.0697	-0.1282	-0.1328	0.0748	0.1306	0.2623	0.1441	-0.1530
APPLE-13	-0.1121	0.0596	-0.1927	-0.0360	-0.0336	-0.0332	0.0366	-0.0655	0.0735	0.0197
APPLE-14	-0.3580	-0.4059	-0.1252	-0.2274	-0.0830	-0.0012	-0.1197	0.2504	0.0014	-0.2196
APPLE-15	-0.0125	0.1962	0.0022	0.0440	-0.0265	0.1311	-0.2983	-0.4550	-0.2538	-0.1559
APPLE-16	0.1884	-0.0361	-0.0140	-0.0914	-0.1337	-0.0577	-0.0751	-0.0189	-0.1207	-0.0778
APPLE-17	0.1473	0.1538	-0.0106	-0.0267	-0.0868	-0.1402	-0.2770	-0.1952	-0.1355	0.0718
APPLE-19	0.0515	0.0851	0.2866	0.1135	0.3167	0.3526	0.3370	0.3351	0.3242	0.2414
APPLE-20	-0.0555	-0.0403	-0.0588	-0.0082	-0.0423	0.0318	-0.1653	-0.3557	-0.0765	-0.3093
APPLE-21	-0.0795	-0.0282	-0.1844	-0.1498	-0.1792	-0.2501	-0.2478	0.0069	-0.0503	-0.1075
APPLE-22	0.1650	0.0345	-0.1182	-0.1631	-0.0156	0.1121	0.1818	0.1902	0.1740	0.2571
APPLE-23	0.0531	0.1218	0.2187	0.3045	0.0812	0.1037	-0.4768	-0.5625	-0.4305	-0.4492
APPLE-24	-0.1764	0.0617	-0.0633	0.0500	0.4352	0.3420	-0.1794	-0.1657	-0.2163	-0.2353
APPLE-25	0.1184	-0.0238	0.2283	0.2918	0.1129	-0.0494	-0.1855	-0.1987	-0.1866	-0.1030
APPLE-26	0.1375	0.0747	-0.0355	0.0822	-0.0684	-0.0887	-0.2607	-0.1300	-0.2549	-0.2198
APPLE-27	-0.0932	-0.2127	-0.0226	0.1138	-0.0170	-0.0855	0.2390	0.1213	0.2351	0.2590
APPLE-28	-0.1505	-0.2324	-0.0147	-0.0907	-0.0904	0.0054	0.2297	0.0569	0.2258	0.2371
APPLE-29	-0.0608	0.2657	0.3048	0.1420	0.3489	0.3425	-0.0511	-0.1129	-0.0565	-0.0313
APPLE-30	-0.1416	-0.0445	-0.1300	-0.0801	0.0266	-0.0456	-0.0155	0.3586	0.2629	0.2778

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Grade 2 Reading (continued)

	WD----11	WD----12	WD----13	WD----14	WD----15	WD----16	WD----17	WD----18	WD----19	WD----20
APPLE-31	-0.1192	-0.2175	-0.0199	0.0127	-0.0548	-0.0670	-0.0781	0.0312	0.0151	0.0044
APPLE-32	-0.1774	-0.2155	-0.1020	-0.0775	-0.0965	0.0447	-0.1905	-0.2976	-0.2396	-0.2385
APPLE-33	0.1650	-0.0470	0.1354	-0.0409	-0.0252	-0.0508	0.0532	0.0918	0.0857	0.1246
APPLE-34	-0.0510	0.0431	-0.0552	0.2237	0.1406	0.0875	-0.2189	0.0247	-0.1689	-0.1727
APPLE-35	0.1053	0.3441	0.0761	0.3491	0.1394	0.3282	0.0342	-0.1459	0.0020	-0.1352
APPLE-36	0.1779	0.3767	0.2087	-0.0893	0.0554	0.2305	-0.1278	-0.0906	-0.0334	0.1130
APPLE-37	-0.1153	-0.1793	-0.0855	-0.0174	-0.1226	0.0176	0.1559	0.0228	0.1508	0.1387
APPLE-38	0.2354	0.1164	0.0035	-0.0007	0.0076	-0.1004	-0.1428	-0.3593	-0.1352	-0.1472
APPLE-39	0.0213	-0.0230	0.0305	-0.0701	-0.3153	-0.2655	-0.2888	-0.0386	-0.1813	-0.3097
APPLE-40	0.2223	0.1618	-0.1228	0.1524	0.0947	0.1250	0.1069	0.1647	0.0991	-0.0575
APPLE-41	0.0434	-0.0224	0.0434	0.0916	0.0787	0.2652	0.2987	0.3223	0.3698	0.1545
APPLE-42	0.2304	0.1047	0.2247	0.3976	0.0456	0.1676	-0.1295	-0.2508	-0.1399	-0.0798
APPLE-43	-0.0404	-0.0333	-0.0374	0.1863	0.1477	-0.0971	-0.1025	-0.1245	-0.1256	-0.0364
APPLE-44	0.1788	-0.0236	-0.1422	-0.0696	-0.1830	-0.1831	-0.2604	-0.2062	-0.2611	-0.1646
APPLE-45	-0.3054	-0.2669	-0.0639	-0.1231	0.1550	0.0488	0.1139	-0.0624	0.3925	0.0810
APPLE-46	0.1166	0.1974	0.3118	-0.0014	-0.0207	0.0862	-0.3406	-0.3763	-0.3822	-0.3610
APPLE-47	-0.0368	0.0306	-0.1109	-0.0698	-0.0191	0.1316	-0.0909	0.0447	0.0697	0.0341
APPLE-48	0.2456	0.0791	-0.1850	-0.1346	-0.3255	-0.2707	-0.3290	-0.0881	-0.2036	-0.0200
APPLE-49	-0.2097	-0.1539	0.0339	-0.0886	-0.0638	0.0912	-0.0936	-0.1867	-0.1573	-0.1304
APPLE-50	0.0213	0.0571	0.2039	0.1808	0.2365	0.3369	0.0511	0.0041	0.0178	0.0421
CATRC-GN	0.2056	0.3615	-0.1036	-0.1208	-0.2418	-0.0831	-0.1468	-0.3519	-0.0970	-0.0218
RAPPL-GN	0.2568	0.0326	0.1579	0.1774	0.0793	-0.1792	-0.0593	-0.0076	-0.0761	-0.0188
DECOD-GN	0.1801	0.1509	-0.1645	-0.1918	-0.1565	-0.1164	-0.1629	-0.1726	-0.0686	-0.0662
RACH.-GN	0.0975	0.3172	-0.0353	0.0043	0.0614	-0.1000	-0.2039	-0.1608	-0.1766	0.0045
TOTRD-GN	0.2145	0.2510	0.0625	0.1389	0.0654	-0.1279	-0.2319	-0.1742	-0.2293	-0.0783

Grade 2 Reading (continued)

	WD----21	WD----22	WD----23	WD----24	WD----25	WD----26	WD----27	WD----28	WD----29	WD----30
WC-----1	-0.1500	-0.1404	-0.0991	-0.2824	0.0731	0.0181	0.3970	-0.2106	-0.1242	-0.2411
WC-----2	-0.1172	-0.2627	-0.0333	-0.1087	0.2841	0.1734	-0.0224	-0.2203	-0.3432	-0.0570
WC-----3	0.1829	0.2587	0.1933	-0.0689	-0.0852	-0.0082	0.0378	0.2003	0.3540	0.3016
WC-----4	-0.1236	-0.1248	0.1425	-0.0502	0.0228	0.0301	0.0952	-0.0135	-0.0407	0.0590
WC-----5	0.0957	0.1544	-0.0894	0.0291	-0.0397	-0.0580	0.1873	0.0413	-0.1149	-0.1315
WC-----6	0.2138	0.1981	-0.1829	-0.1459	-0.1035	-0.0541	0.4523	-0.0752	-0.3014	-0.1805
WC-----7	0.1064	0.1056	0.2346	-0.0752	-0.0072	-0.0560	-0.0083	0.1683	0.5265	0.1296
WC-----8	0.0682	0.2325	0.2628	-0.2928	-0.0113	-0.0168	-0.0076	0.5765	0.7235	0.6135
WC-----9	0.0158	-0.0836	0.0913	-0.0925	0.1180	-0.0258	0.0874	-0.1313	-0.2201	0.0269
WC----10	-0.0741	-0.2437	0.0467	-0.0256	0.1120	0.1120	-0.2480	0.0070	-0.2058	-0.0093
WC----11	0.1916	-0.0146	-0.3121	-0.2410	-0.2032	0.1918	-0.0420	-0.1335	-0.1574	0.0608
WC----12	-0.0294	-0.1701	-0.0823	-0.3409	0.1423	0.2312	0.1125	-0.1293	-0.2538	0.0964
WC----13	0.0123	-0.0155	-0.1752	0.3455	0.0056	0.0056	-0.0352	0.0273	-0.0411	-0.1919
WC----14	-0.0917	-0.2256	-0.1231	0.0607	0.1995	0.0000	0.2103	-0.1267	-0.1317	-0.1457
WC----15	-0.0331	-0.2127	0.2045	0.1946	0.3061	-0.0969	0.0551	0.0152	0.2585	-0.0899
WC----16	-0.0901	-0.3101	0.1499	0.1723	0.3436	-0.0958	-0.0312	0.0683	0.0032	-0.1156
WC----17	0.1654	0.1513	0.0932	-0.1839	0.2188	0.0833	-0.2418	0.4935	0.6214	0.4627
WC----18	0.0343	0.2839	0.1499	-0.2689	0.0420	-0.1625	0.0298	0.5502	0.5227	0.3297
WC----19	0.1174	0.2437	0.0898	-0.3611	0.2127	0.1455	-0.0296	0.5356	0.7660	0.4530
WD----20	0.0366	0.1448	0.1142	-0.2253	-0.0192	0.2532	-0.0101	0.6358	0.5399	0.2834
WD----21	1.0000	0.7068	-0.0213	-0.0308	0.0551	0.0950	-0.0339	-0.0147	0.0538	0.0031
WC----22	0.7068	1.0000	-0.1047	0.0031	-0.1919	-0.0583	0.1571	0.2271	0.0940	0.0770
WC----23	-0.0213	-0.1047	1.0000	-0.1409	0.4166	0.2160	-0.0976	0.2634	0.2007	0.3861
WD----24	-0.0308	0.0031	-0.1409	1.0000	-0.2941	-0.4260	-0.2245	-0.2783	-0.3578	-0.4389
WD----25	0.0551	-0.1919	0.4166	-0.2941	1.0000	0.1333	0.0703	0.0635	0.1518	0.1563
WD----26	0.0950	-0.0583	0.2160	-0.4260	0.1333	1.0000	-0.1581	0.1956	-0.0007	0.1121
WC----27	-0.0339	0.1571	-0.0976	-0.2245	0.0703	-0.1581	1.0000	-0.0361	-0.0369	-0.1155
WC----28	-0.0147	0.2271	0.2634	-0.2783	0.0635	0.1956	-0.0361	1.0000	0.4063	0.5038
WD----29	0.0538	0.0940	0.2007	-0.3578	0.1518	-0.0007	-0.0369	0.4063	1.0000	0.4902
WC----30	0.0031	0.0770	0.3861	-0.4389	0.1563	0.1121	-0.1155	0.5038	0.4902	1.0000
WC----31	0.0210	0.2371	0.0849	-0.4366	0.0086	0.0086	0.0434	0.4887	0.6663	0.5071
WD----32	-0.0469	-0.0451	0.1651	0.3690	0.2120	-0.3513	0.1926	-0.3717	-0.3019	-0.1796
WC----33	-0.2038	-0.0098	-0.0458	0.0069	-0.1092	-0.0046	-0.1765	0.4586	0.3832	0.4009
WC----34	0.3340	0.4263	0.0079	-0.1573	-0.0205	-0.1092	0.3750	0.2532	-0.1221	0.2552

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Grade 2 Reading (continued)

	WD----21	WD----22	WD----23	WD----24	WD----25	WD----26	WD----27	WD----28	WD----29	WD----30
RAMOS--1	0.2207	0.1573	0.0361	-0.1616	0.1036	-0.0378	0.1496	0.0238	0.2981	0.0880
RAMOS--2	0.0867	-0.0181	-0.1133	-0.0798	-0.1116	-0.0230	0.1513	0.1436	0.2815	0.1357
RAMOS--3	0.2241	0.2872	0.1701	-0.1039	0.1075	0.0191	0.0473	-0.2050	-0.0507	-0.0869
RAMOS--4	-0.1303	-0.1551	0.4481	-0.0163	0.4421	-0.0909	-0.0113	0.0693	0.1939	-0.0180
RAMOS--5	0.1375	0.1543	-0.1519	-0.1204	0.4649	-0.0788	-0.1297	-0.0081	0.1738	0.0760
RAMOS--6	-0.1813	-0.1310	-0.0655	-0.2207	0.0472	0.0855	-0.1469	0.1282	0.1250	0.0274
RAMOS--7	0.2734	0.1837	0.1158	0.1114	0.1677	-0.1070	0.0744	-0.0433	0.1656	-0.0845
RAMOS--8	0.0330	0.0062	-0.0798	-0.0489	0.1593	-0.1644	0.0260	0.0250	0.1560	0.0910
RAMOS--9	0.1149	0.0648	-0.0259	0.1553	0.1293	-0.1776	0.1471	-0.1412	0.1622	-0.1452
RAMOS-10	0.0959	0.0804	0.1024	-0.1829	0.1763	-0.1571	-0.0059	-0.0875	0.0368	0.1664
RAMOS-11	0.0873	0.2216	-0.1648	0.2605	-0.1034	-0.1742	0.2066	-0.2971	-0.3772	-0.2816
RAMOS-12	-0.0244	-0.0844	-0.1208	-0.1431	0.0972	-0.1575	-0.0669	-0.1468	0.2646	-0.2112
RAMOS-13	-0.0608	-0.1461	-0.0335	0.1051	0.0954	-0.1612	-0.1300	-0.1426	-0.2713	-0.1149
RAMOS-14	0.0590	0.0937	0.2066	-0.1546	0.1671	0.2691	-0.0425	-0.0214	0.1241	0.1148
RAMOS-15	-0.1023	0.0312	-0.0758	0.1847	0.1156	-0.1301	0.2285	0.1190	0.2650	-0.1155
RAMOS-16	0.0738	0.0210	-0.0475	0.0165	0.2098	-0.2792	0.3534	-0.0860	-0.1621	-0.0977
RAMOS-17	0.2321	-0.0374	0.0935	-0.0615	0.1616	0.0135	-0.2129	-0.3135	-0.0584	-0.0562
RAMOS-18	0.1033	0.0838	-0.1029	0.0673	-0.0925	-0.0925	-0.0879	0.0937	0.0654	0.0383
RAMOS-19	-0.0706	0.0857	0.0022	0.1624	-0.0827	-0.1233	-0.1184	-0.0959	-0.0564	-0.1021
RAMOS-20	0.1864	0.1685	0.2373	-0.0334	-0.1511	-0.1511	-0.0796	-0.0164	-0.0162	0.2536

Grade 2 Reading (continued)

	WD----21	WD----22	WD----23	WD----24	WD----25	WD----26	WD----27	WD----28	WD----29	WD----30
APPLE--1	-0.3453	-0.3620	-0.1697	0.3303	-0.1650	-0.2863	0.0475	-0.4202	-0.1794	-0.3554
APPLE--2	0.1646	-0.0440	0.1089	-0.0731	-0.0004	0.2247	0.0087	-0.1036	0.0499	0.0283
APPLE--3	-0.3303	-0.3434	-0.1609	0.0179	0.0907	-0.1228	0.3030	-0.2749	-0.1541	-0.2585
APPLE--4	0.0097	0.1252	-0.2293	-0.0429	-0.0712	0.2369	0.1672	0.0430	0.2156	-0.0747
APPLE--5	-0.1605	-0.2357	-0.2070	0.0202	0.3415	-0.2604	0.1826	-0.3336	-0.2223	-0.0985
APPLE--6	-0.0902	-0.2669	0.1964	0.0543	0.2189	0.0338	-0.1900	-0.0999	-0.1236	-0.0151
APPLE--7	-0.2211	-0.1075	-0.0921	-0.0985	-0.2234	0.1050	0.1365	0.0365	0.2574	-0.1285
APPLE--8	0.2997	0.0202	-0.0964	0.1739	0.0221	-0.1479	-0.1274	-0.0553	0.0766	-0.0496
APPLE--9	-0.1727	-0.1858	0.3604	-0.1424	0.4617	0.1615	-0.0870	0.1546	0.3246	0.2892
APPLE-10	-0.1256	0.0314	0.1688	-0.1342	0.0845	-0.0983	0.2254	0.1542	0.1757	0.0334
APPLE-11	-0.0076	-0.1220	0.0763	-0.1430	0.1539	-0.2088	0.1434	-0.2094	0.0944	0.0681
APPLE-12	-0.1987	0.1027	-0.1228	0.1779	-0.1588	-0.1612	-0.1227	0.1526	-0.2199	-0.0807
APPLE-13	-0.3550	-0.2691	-0.0750	-0.1347	-0.0014	0.0350	-0.0055	0.0674	0.1058	0.2181
APPLE-14	0.0024	0.3259	0.0050	0.1709	-0.2412	-0.2093	0.0183	0.1591	-0.1055	-0.1025
APPLE-15	0.1218	-0.0334	0.1410	-0.0253	0.3817	0.1914	0.1066	-0.1584	-0.3477	-0.1782
APPLE-16	0.1590	0.1119	0.2153	0.1147	-0.1063	-0.0768	-0.1535	0.0841	0.0009	0.1878
APPLE-17	0.0208	0.0738	-0.0714	-0.0724	-0.1380	0.1292	-0.0954	0.0749	-0.0318	-0.1264
APPLE-19	-0.0151	-0.1181	0.0019	-0.0733	0.1065	0.2467	-0.0877	0.2268	0.2477	-0.1366
APPLE-20	-0.1436	0.0296	-0.2823	0.2596	-0.1292	-0.2857	0.0346	-0.3140	-0.0553	-0.1218
APPLE-21	0.2319	0.1907	-0.1305	-0.3839	-0.1389	0.3479	0.2239	-0.0606	-0.0497	-0.0737
APPLE-22	0.1024	0.0563	0.5679	-0.2289	0.0078	-0.0109	-0.1183	0.3212	0.2729	0.4606
APPLE-23	-0.1982	-0.2339	-0.1509	0.3075	0.0338	-0.1263	0.1337	-0.5747	-0.4846	-0.4500
APPLE-24	-0.2448	-0.3091	0.1837	0.2540	0.0988	-0.1173	-0.2231	-0.0838	0.0465	-0.1813
APPLE-25	-0.1363	-0.1794	0.0461	0.2225	-0.0684	-0.0684	-0.0964	-0.1915	-0.1678	-0.1336
APPLE-26	0.1908	0.0304	-0.0932	0.1139	0.0364	-0.1681	-0.1357	-0.2238	-0.1506	-0.1965
APPLE-27	-0.1730	-0.2405	0.5195	-0.2132	0.3427	0.2997	-0.0026	0.1300	0.2371	0.1843
APPLE-28	-0.1813	-0.2270	0.4577	-0.2002	0.2766	0.2538	-0.0719	0.1782	0.2427	0.1896
APPLE-29	-0.0394	0.0364	0.0393	0.1441	0.1295	0.2042	0.3177	0.1034	-0.1777	-0.0259
APPLE-30	-0.1187	0.0399	-0.0904	-0.4127	-0.1390	0.2187	0.4231	0.2520	0.2649	-0.1066

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	WD----21	WD----22	WD----23	WD----24	WD----25	WD----26	WD----27	WD----28	WD----29	WD----30
APPLE-31	0.2579	0.2114	-0.1147	0.0882	-0.0880	-0.1375	0.1731	-0.0845	0.0340	-0.1270
APPLE-32	0.1167	0.1423	-0.0881	0.2198	-0.1049	-0.1217	-0.0287	-0.2952	-0.2204	-0.1694
APPLE-33	0.0756	0.0110	-0.1491	-0.0685	-0.1814	0.1734	-0.0733	0.1203	0.1331	0.0574
APPLE-34	-0.0136	-0.1394	-0.0118	0.0044	0.2014	-0.2792	0.2297	-0.1579	0.0053	-0.1485
APPLE-35	-0.0446	-0.2712	0.1189	-0.2000	0.6230	0.1913	0.2552	-0.1933	-0.1519	-0.1915
APPLE-36	-0.1699	-0.1879	-0.0397	-0.0560	-0.1017	0.1992	-0.1381	0.1389	-0.0402	-0.1478
APPLE-37	-0.1860	-0.1960	0.4433	-0.1755	0.2867	0.2510	-0.0823	0.1420	0.1323	0.2194
APPLE-38	0.1129	0.0646	-0.0093	0.1006	0.0644	-0.1953	-0.1172	-0.2682	0.0230	0.1430
APPLE-39	-0.0997	0.0437	-0.1171	0.1264	-0.2327	-0.0302	0.1666	-0.1119	-0.3579	-0.1871
APPLE-40	0.1732	0.1209	0.3156	-0.0891	0.0595	-0.2315	0.0403	0.0423	-0.0431	0.2272
APPLE-41	-0.2553	-0.1553	0.2397	-0.1826	0.0293	-0.0427	0.0091	0.0820	0.2030	0.0876
APPLE-42	0.1610	-0.1522	0.1356	-0.1450	0.1063	0.1890	-0.0796	-0.1837	-0.2841	-0.0177
APPLE-43	-0.0387	-0.1856	0.1732	0.2332	0.1778	-0.1001	-0.0169	-0.1862	-0.0629	-0.0888
APPLE-44	0.1626	0.0937	-0.0411	0.2408	-0.1395	-0.1395	-0.1043	-0.0151	-0.2010	-0.1445
APPLE-45	-0.2729	-0.1769	-0.0027	-0.2327	0.1655	0.2396	-0.1429	0.0895	0.5079	0.2164
APPLE-46	-0.0822	-0.1891	-0.1062	0.2882	-0.0006	-0.0503	0.0104	-0.4448	-0.3318	-0.3329
APPLE-47	0.0561	0.2163	0.0705	-0.2785	-0.0803	-0.0899	0.3169	0.0761	0.0009	0.0254
APPLE-48	0.2898	0.2133	-0.1321	-0.0968	-0.2280	-0.0197	0.0699	-0.0296	-0.1558	-0.1277
APPLE-49	-0.0120	-0.0383	-0.2200	0.2386	-0.0860	-0.1686	-0.1372	-0.2732	-0.0710	-0.2187
APPLE-50	0.2069	0.0660	0.2086	0.2275	0.1027	-0.2482	-0.0464	0.0001	-0.0452	0.1383
CATRC-GN	-0.0240	0.0209	-0.1215	-0.2506	-0.0437	0.3470	0.1390	-0.0546	-0.2101	0.0307
RAPPL-GN	0.0829	0.0858	-0.1659	0.3075	-0.2611	-0.1540	-0.1403	-0.2061	0.0266	-0.0966
CECOC-GN	0.0623	0.0683	0.2715	-0.1793	-0.0958	0.1983	-0.1486	-0.0097	0.1221	0.2387
RACH.-GN	-0.0936	-0.0232	0.1843	-0.0868	-0.1309	0.3452	-0.0037	0.0814	-0.1209	0.2012
TOTRC-GN	0.0795	0.0734	-0.0329	0.1083	-0.1537	0.1117	-0.0145	-0.1943	-0.1936	-0.1522

	WD----31	WD----32	WD----33	WD----34	RAMOS--1	RAMOS--2	RAMOS--3	RAMOS--4	RAMOS--5	RAMOS--6
WD-----1	-0.0821	0.1197	-0.3815	0.0189	0.0564	0.0185	0.1058	0.0268	-0.1703	0.1292
WD-----2	-0.1921	0.2074	-0.3304	-0.1069	-0.0522	-0.0506	0.0112	-0.2394	0.1541	0.0392
WD-----3	0.3468	-0.1008	-0.0689	0.2566	-0.0203	-0.0378	0.1189	-0.1817	-0.1542	0.0522
WD-----4	-0.0024	0.1209	-0.1960	-0.0580	0.2620	0.1863	0.1611	-0.0465	-0.0996	0.0379
WD-----5	-0.0311	-0.0223	-0.2226	0.1287	-0.1345	-0.0526	-0.0528	-0.2263	-0.0641	-0.0413
WD-----6	-0.1403	0.0695	-0.3193	0.3363	0.0346	0.0466	0.0772	-0.2698	-0.0914	-0.0192
WD-----7	0.4487	-0.1163	0.0982	-0.1432	0.1576	0.2117	-0.0890	0.1726	-0.1078	0.0690
WD-----8	0.7103	-0.3473	0.4273	0.2267	0.2673	0.1986	0.1540	-0.0947	-0.0043	0.1359
WD-----9	-0.3795	0.1028	-0.0747	0.1855	0.0129	-0.0879	0.1156	0.1656	0.0147	-0.1003
WD----10	-0.2006	-0.0913	-0.0185	0.2065	-0.0092	-0.0454	-0.0078	0.1690	0.0779	0.0074
WD----11	-0.2129	-0.2483	-0.0400	0.1424	0.0052	0.1299	-0.0950	-0.3794	-0.0261	0.1126
WD----12	-0.2210	-0.0580	-0.1752	0.2412	-0.0041	-0.0061	-0.0675	0.0942	0.1648	0.0448
WD----13	-0.0238	0.0495	0.0236	-0.0379	-0.1221	-0.1099	-0.0243	-0.0938	0.0709	-0.0428
WD----14	-0.2393	0.0418	-0.1243	0.0340	-0.1828	-0.1025	-0.1330	-0.0427	0.0096	-0.1588
WD----15	-0.0436	0.0439	0.0213	-0.1321	0.0576	0.0955	-0.1650	0.4358	-0.0090	-0.0499
WD----16	0.0248	0.2608	-0.0257	-0.0996	-0.1624	-0.0407	-0.2962	0.2797	0.0681	0.0908
WD----17	0.6403	-0.3496	0.3843	0.1256	0.2707	0.2105	0.0016	-0.0062	0.4085	0.1225
WD----18	0.5962	-0.3983	0.2509	0.3153	0.3503	0.1711	0.1822	0.2084	0.2689	0.2028
WD----19	0.7635	-0.3096	0.3280	0.0562	0.2871	0.1872	0.0688	0.0131	0.3820	0.1230
WD----20	0.3275	-0.3899	0.4208	0.0098	0.0266	0.1564	-0.1318	-0.1632	-0.1143	0.1058
WD----21	0.0210	-0.0469	-0.2038	0.3340	0.2207	0.0867	0.2241	-0.1303	0.1375	-0.1813
WD----22	0.2371	-0.0451	-0.0098	0.4263	0.1573	-0.0181	0.2872	-0.1551	0.1543	-0.1310
WD----23	0.0849	0.1651	-0.0458	0.0079	0.0361	-0.1133	0.1701	0.4481	-0.1519	-0.0655
WD----24	-0.4366	0.3690	0.0069	-0.1573	-0.1616	-0.0798	-0.1039	-0.0163	-0.1204	-0.2207
WD----25	0.0086	0.2120	-0.1092	-0.0205	0.1036	-0.1116	0.1075	0.4421	0.4649	0.0472
WD----26	0.0086	-0.3513	-0.0046	-0.1092	-0.0378	-0.0230	0.0191	-0.0909	-0.0788	0.0855
WD----27	0.0434	0.1926	-0.1765	0.3750	0.1496	0.1513	0.0473	-0.0113	-0.1297	-0.1469
WD----28	0.4887	-0.3717	0.4586	0.2532	0.0238	0.1436	-0.2050	0.0693	-0.0081	0.1282
WD----29	0.6663	-0.3019	0.3832	-0.1221	0.2981	0.2815	-0.0507	0.1939	0.1738	0.1250
WD----30	0.5071	-0.1796	0.4009	0.2552	0.0880	0.1357	-0.0869	-0.0180	0.0760	0.0274
WD----31	1.0000	-0.3094	0.3065	0.2970	0.3186	0.1514	0.1960	0.0440	0.2921	0.1717
WD----32	-0.3094	1.0000	-0.4795	-0.0896	-0.1733	-0.1778	-0.0282	0.0207	0.0637	-0.2299
WD----33	0.3065	-0.4795	1.0000	0.1366	0.1082	0.2263	-0.2015	0.1508	-0.0420	-0.0245
WD----34	0.2970	-0.0896	0.1366	1.0000	0.2959	0.0808	0.3221	0.0460	0.1084	-0.2957

Grade 2 Reading (continued)

	WD----31	WD----32	WD----33	WD----34	RAMOS--1	RAMOS--2	RAMOS--3	RAMOS--4	RAMOS--5	RAMOS--6
RAMOS--1	0.3186	-0.1733	0.1082	0.2959	1.0000	0.7284	0.3791	0.1407	0.1966	0.0759
RAMOS--2	0.1514	-0.1778	0.2263	0.0808	0.7284	1.0000	-0.2488	-0.1681	-0.2225	0.1062
RAMOS--3	0.1960	-0.0282	-0.2015	0.3221	0.3791	-0.2488	1.0000	-0.0605	0.1471	-0.2208
RAMOS--4	0.0440	0.0207	0.1508	0.0460	0.1407	-0.1681	-0.0605	1.0000	0.5447	0.2926
RAMOS--5	0.2921	0.0637	-0.0420	0.1084	0.1966	-0.2225	0.1471	0.5447	1.0000	0.2010
RAMOS--6	0.1717	-0.2299	-0.0245	-0.2957	0.0759	[illegible]	-0.2208	0.2920	0.2010	1.0000
RAMOS--7	0.0439	-0.0218	-0.0137	0.1963	0.4329	[illegible]454	0.2774	0.0659	0.0732	-0.0875
RAMOS--8	0.2374	-0.0130	0.1869	0.1663	0.4377	0.3805	0.0386	-0.0214	0.2756	-0.1398
RAMOS--9	0.1189	0.0139	0.0713	0.1078	0.7111	0.4648	0.2106	0.2802	0.3700	0.1367
RAMOS-10	0.0876	0.1392	-0.2437	-0.1498	-0.2263	-0.1377	-0.0739	-0.1446	-0.0803	0.4656
RAMOS-11	-0.1022	0.2278	-0.2971	0.1270	0.0780	-0.0684	0.2914	-0.1540	0.0191	0.0319
RAMOS-12	0.2397	0.0194	-0.0471	-0.1338	0.1348	0.0207	0.0107	0.2129	0.3025	0.1924
RAMOS-13	-0.2030	-0.0749	-0.1100	-0.0847	-0.0475	-0.0694	0.1088	-0.1130	-0.1035	-0.0123
RAMOS-14	0.0708	-0.2011	-0.0890	-0.0697	0.0353	-0.1436	0.3444	-0.0655	-0.0995	0.2913
RAMOS-15	0.2507	-0.1015	0.2309	0.0572	0.4520	0.2924	-0.0085	0.4190	0.4034	0.2027
RAMOS-16	-0.1622	0.4260	-0.2537	0.1863	0.1477	0.2061	-0.0657	-0.1128	0.0797	-0.1681
RAMOS-17	0.0007	0.1246	-0.1812	0.0000	0.2908	0.0399	0.2918	0.0808	0.2950	-0.1345
RAMOS-18	-0.0173	-0.1785	0.2021	-0.0784	0.1828	0.4185	-0.2811	-0.0946	-0.1423	0.4506
RAMOS-19	-0.1247	0.0463	0.0051	-0.1649	-0.2272	-0.2831	0.0969	0.0255	-0.1004	-0.0682
RAMOS-20	0.0617	0.1708	-0.1573	0.0567	-0.3122	-0.2284	-0.0805	-0.0857	-0.1240	0.2386

Grade 2 Reading (continued)

	WD----31	WD----32	WD----33	WD----34	RAMOS--1	RAMOS--2	RAMOS--3	RAMOS--4	RAMOS--5	RAMOS--6
APPLE--1	-0.2635	0.3065	-0.2930	-0.3565	-0.2358	-0.2567	-0.0962	0.2556	0.0489	0.3036
APPLE--2	-0.0626	-0.0875	-0.0415	-0.1373	-0.0979	0.0055	-0.1517	0.0220	-0.0858	-0.0129
APPLE--3	-0.1505	0.2490	-0.2324	-0.0361	0.0366	0.0087	-0.2677	0.5349	0.3356	0.5014
APPLE--4	0.2645	-0.0300	0.0383	-0.2052	0.2349	0.3335	-0.2025	0.0361	0.1447	0.2297
APPLE--5	-0.2732	0.3379	-0.0687	-0.0722	0.0246	0.0557	-0.1263	0.0768	0.1510	0.2541
APPLE--6	-0.0698	0.1587	-0.1685	-0.1041	-0.1893	-0.1647	-0.0952	0.0175	0.1151	-0.0906
APPLE--7	0.1604	-0.0412	-0.0355	-0.1693	0.1725	0.2180	-0.0227	0.0006	-0.1206	0.2089
APPLE--8	-0.0363	-0.1418	0.1226	0.1909	0.1609	0.1443	0.0705	-0.0610	-0.0310	-0.0216
APPLE--9	0.1199	0.1325	0.1384	-0.1469	-0.0949	-0.2041	0.0775	0.0784	0.1858	-0.0036
APPLE-10	0.2322	0.0351	-0.1027	-0.0109	0.0143	-0.1890	0.0981	0.4166	0.2040	0.2114
APPLE-11	0.0912	-0.0965	-0.0617	0.0570	0.0886	-0.0222	0.1833	-0.0119	0.0104	-0.1833
APPLE-12	0.1840	-0.0271	0.1292	0.1222	-0.0488	-0.1646	0.1972	-0.1142	0.0870	-0.0568
APPLE-13	0.1825	0.0377	0.2731	0.0720	0.1497	0.2486	-0.1741	0.0269	0.0495	-0.1032
APPLE-14	0.1388	0.0380	0.1261	0.2557	0.1083	-0.0894	0.3391	-0.0114	-0.0401	-0.2564
APPLE-15	-0.3756	0.3077	-0.3119	-0.0929	-0.2656	-0.2038	-0.0537	-0.1219	-0.0455	-0.1284
APPLE-16	-0.1070	0.3241	-0.1507	-0.0327	-0.0806	0.0337	-0.1069	-0.1223	-0.1027	0.1060
APPLE-17	-0.2055	-0.1773	0.0407	-0.2710	-0.3395	-0.1592	-0.2432	-0.0452	-0.1497	-0.1458
APPLE-19	0.3202	-0.3584	0.0969	0.0616	0.2786	0.1601	-0.0697	0.4471	0.3218	0.5674
APPLE-20	-0.0410	0.4519	-0.1254	-0.2253	-0.0535	-0.0373	-0.0181	-0.1507	0.1456	-0.2772
APPLE-21	0.0535	-0.2144	-0.2182	0.1604	0.1147	-0.0323	0.3059	-0.0961	-0.0849	-0.1603
APPLE-22	0.2569	0.1262	-0.0713	0.0992	-0.0233	0.0520	-0.0622	-0.0120	-0.1692	0.2656
APPLE-23	-0.5205	0.3278	-0.2784	-0.2344	-0.2137	-0.2348	0.0235	0.0314	-0.0491	-0.1445
APPLE-24	-0.1884	0.1616	-0.0684	-0.3083	-0.0334	-0.0852	-0.2348	0.6340	0.2191	0.3637
APPLE-25	-0.0486	-0.1311	-0.0600	-0.1017	0.0311	-0.1770	-0.0963	0.7280	0.4617	0.5118
APPLE-26	-0.1882	0.0250	-0.0820	-0.0553	-0.2261	-0.1787	-0.1414	0.1056	0.0330	0.0181
APPLE-27	0.0276	-0.0133	-0.0651	-0.2386	-0.0156	-0.0467	0.0985	-0.0340	-0.1144	0.0551
APPLE-28	0.1525	-0.0422	-0.0173	-0.2421	-0.1034	-0.1297	0.0793	-0.0522	-0.0742	0.1390
APPLE-29	-0.1432	0.1626	0.0368	0.1493	-0.1309	0.0161	-0.2669	0.0928	-0.0350	0.0647
APPLE-30	0.3503	-0.2283	-0.1385	0.0256	0.2515	0.2360	0.1004	-0.0439	-0.1321	0.2303

Grade 2 Reading (continued)

	WD----31	WD----32	WD----33	WD----34	RAMOS--1	RAMOS--2	RAMOS--3	RAMOS--4	RAMOS--5	RAMOS--6
APPLE-31	0.0602	0.0858	-0.0537	0.1085	-0.0245	0.0874	-0.1022	-0.0968	-0.1247	-0.1486
APPLE-32	-0.0975	0.2163	-0.1395	-0.0382	-0.1237	-0.1639	0.1257	-0.1294	-0.0615	-0.0298
APPLE-33	0.1036	-0.5498	0.3414	0.1914	0.3109	0.3041	0.1248	-0.1245	-0.1421	0.0786
APPLE-34	-0.0533	0.1232	-0.0325	0.1331	-0.0082	-0.0211	-0.1727	0.3760	0.1479	0.0001
APPLE-35	-0.0780	0.2323	-0.2533	0.1391	0.0637	-0.0608	0.0845	0.0592	0.2946	-0.0085
APPLE-36	-0.0604	-0.1104	-0.0763	-0.2147	-0.1116	0.0086	-0.2130	0.0922	-0.0656	0.2687
APPLE-37	0.0361	0.0612	-0.0752	-0.2572	-0.1730	-0.2054	0.0551	-0.0136	-0.0290	0.1518
APPLE-38	-0.2294	0.3383	-0.0298	-0.2027	-0.1609	-0.1837	0.0881	-0.1538	-0.0088	-0.1419
APPLE-39	-0.0046	0.1526	-0.1265	0.2294	0.2240	0.0158	0.4184	-0.1080	-0.0954	-0.2055
APPLE-40	0.1595	0.3205	-0.2623	0.3312	0.0217	-0.1675	0.0495	0.3957	0.3116	0.1008
APPLE-41	0.3176	0.0846	-0.1846	-0.0410	0.0651	-0.0455	0.2251	-0.1744	0.0692	0.0905
APPLE-42	-0.1484	-0.0111	-0.2621	0.0551	-0.1836	-0.2062	0.1383	-0.1760	-0.1433	-0.0214
APPLE-43	-0.1826	0.1035	-0.1168	-0.1652	-0.1040	-0.0916	-0.0156	-0.0024	-0.0305	-0.1812
APPLE-44	-0.2373	0.2442	-0.1801	0.0467	0.0217	0.0321	0.0479	-0.0845	-0.0947	-0.1215
APPLE-45	0.2961	-0.1160	0.3146	-0.4539	0.0834	0.0344	-0.0803	0.2267	0.2360	0.1348
APPLE-46	-0.4081	0.3095	-0.3275	-0.2872	-0.0592	0.0149	-0.0770	-0.0468	-0.0829	0.2278
APPLE-47	0.1555	0.1979	-0.3074	0.1232	-0.0649	0.0568	-0.0586	-0.2115	-0.1787	-0.0331
APPLE-48	-0.1360	-0.0527	-0.1077	0.1261	-0.1635	-0.0428	-0.0387	-0.2098	-0.2576	-0.1755
APPLE-49	0.0031	0.2449	-0.1383	-0.1182	-0.1935	-0.0813	-0.1115	-0.1677	-0.0464	0.0573
APPLE-50	0.0200	0.3446	-0.2211	0.2721	-0.2308	-0.1835	-0.0417	-0.1015	-0.0292	-0.1071
CATRC-GN	-0.0286	0.1168	-0.1707	0.0895	-0.2723	-0.2323	-0.0082	-0.1594	-0.0360	-0.0900
RAPPL-GN	-0.2980	0.1933	-0.2064	-0.1589	-0.0267	0.1477	-0.1843	-0.1407	-0.1159	0.0996
CECOD-GN	0.0182	0.1302	-0.2342	-0.2507	-0.2017	-0.0647	-0.1369	-0.0918	-0.1823	0.2621
RACH.-GN	-0.1005	-0.1245	0.1335	0.1445	0.0201	0.1401	-0.0584	-0.0471	-0.3505	0.0466
TOTRC-GN	-0.3701	0.2072	-0.3975	-0.0141	-0.1232	-0.0079	-0.0820	-0.1175	-0.2029	0.0069

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Grade 2 Reading (continued)

	RAMOS--7	RAMOS--8	RAMOS--9	RAMOS-10	RAMOS-11	RAMOS-12	RAMOS-13	RAMOS-14	RAMOS-15	RAMOS-16
WD-----1	-0.1623	-0.0712	-0.1689	0.0734	0.0585	0.0246	-0.0013	0.0966	-0.0733	-0.0368
WD-----2	0.0261	0.0246	0.0414	-0.1099	0.0396	-0.1018	0.1237	-0.0934	-0.0223	0.1509
WD-----3	0.1646	-0.2604	-0.2329	0.3525	-0.0064	-0.1271	0.0933	0.3957	-0.1035	-0.0352
WD-----4	-0.1789	0.1086	0.1630	0.0234	-0.2675	0.0675	-0.0062	0.1390	-0.0332	0.0247
WD-----5	0.0106	-0.1911	-0.1744	0.0359	-0.0964	-0.0697	0.1201	0.0586	-0.0843	0.1323
WD-----6	0.0282	-0.2443	-0.1741	0.0722	0.0377	-0.1674	0.1896	-0.1105	0.0023	0.1714
WD-----7	0.0287	0.1580	0.0505	0.0833	-0.0474	0.0990	-0.0686	0.0259	0.2460	-0.2323
WD-----8	0.0203	0.1280	-0.0016	0.0964	-0.1894	-0.1397	-0.1385	0.1821	0.1749	-0.2129
WD-----9	0.2812	-0.0661	0.1073	0.0200	0.0839	0.0330	0.2689	0.0656	0.0093	0.1840
WD----10	0.1700	0.0384	0.0529	-0.0445	-0.0245	0.0834	0.1592	-0.0164	-0.0073	0.0704
WD----11	0.0289	0.1294	0.0803	0.0524	0.0713	0.0673	0.0757	0.0176	-0.1831	0.1504
WD----12	0.0593	0.0020	0.0602	0.0111	-0.0484	0.1217	0.0614	-0.0060	-0.0388	0.1588
WD----13	-0.1898	0.1905	0.0943	0.0265	0.0036	-0.0232	-0.0835	-0.0228	0.2614	-0.2401
WD----14	0.0156	0.1368	-0.0214	-0.0480	0.1013	-0.1360	0.1903	0.0179	0.1279	0.0245
WD----15	0.2259	-0.0683	0.1067	-0.0688	-0.0441	-0.0623	-0.0184	-0.0786	0.4065	-0.0436
WD----16	-0.2122	0.1532	-0.0038	0.1252	-0.1504	0.0473	-0.1932	-0.2290	0.1604	-0.0744
WD----17	0.0575	0.3252	0.1419	0.0141	-0.1922	0.0808	-0.0463	0.0692	0.3375	-0.1617
WD----18	0.1400	0.2487	0.1796	0.0195	-0.2097	0.2488	-0.0487	0.1456	0.2718	-0.1915
WD----19	-0.0210	0.3190	0.1315	0.0467	-0.2237	0.1277	-0.2584	0.1207	0.3108	-0.1833
WD----20	-0.0218	-0.0616	-0.1107	-0.0849	-0.4002	-0.1428	-0.1098	0.1150	0.1214	-0.1851
WD----21	0.2734	0.0330	0.1149	0.0959	0.0873	-0.0244	-0.0608	0.0590	-0.1023	0.0738
WD----22	0.1837	0.0062	0.0648	0.0804	0.2216	-0.0844	-0.1461	0.0937	0.0312	0.0210
WD----23	0.1158	-0.0798	-0.0259	0.1024	-0.1648	-0.1208	-0.0335	0.2066	-0.0758	-0.0475
WD----24	0.1114	-0.0489	0.1553	-0.1829	0.2605	-0.1431	0.1051	-0.1546	0.1847	0.0165
WD----25	0.1677	0.1593	0.1293	0.1763	-0.1034	0.0972	0.0954	0.1671	0.1156	0.2098
WD----26	-0.1070	-0.1644	-0.1776	-0.1571	-0.1742	-0.1575	-0.1612	0.2691	-0.1301	-0.2792
WD----27	0.0744	0.0260	0.1471	-0.0059	0.2066	-0.0669	-0.1300	-0.0425	0.2285	0.3534
WD----28	-0.0433	0.0250	-0.1412	-0.0875	-0.2971	-0.1468	-0.1426	-0.0214	0.1190	-0.0860
WD----29	0.1656	0.1560	0.1622	0.0368	-0.3772	0.2646	-0.2713	0.1241	0.2650	-0.1621
WD----30	-0.0845	0.0910	-0.1452	0.1664	-0.2816	-0.2112	-0.1149	0.1148	-0.1155	-0.0977
WD----31	0.0439	0.2374	0.1189	0.0876	-0.1022	0.2397	-0.2030	0.0708	0.2507	-0.1622
WD----32	-0.0218	-0.0130	0.0139	0.1392	0.2278	0.0194	-0.0749	-0.2011	-0.1015	0.4260
WD----33	-0.0137	0.1869	0.0713	-0.2437	-0.2971	-0.0471	-0.1100	-0.0890	0.2309	-0.2537
WD----34	0.1963	0.1663	0.1078	-0.1498	0.1270	-0.1338	-0.0847	-0.0697	0.0572	0.1863

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Grade 2 Reading (continued)

	RAMOS--7	RAMOS--8	RAMOS--9	RAMOS-10	RAMOS-11	RAMOS-12	RAMOS-13	RAMOS-14	RAMOS-15	RAMOS-16
RAMOS--1	0.4329	0.4377	0.7111	-0.2263	0.0780	0.1348	-0.0475	0.0353	0.4520	0.1477
RAMOS--2	0.2454	0.3805	0.4648	-0.1377	-0.0684	0.0207	-0.0694	-0.1436	0.2924	0.2061
RAMOS--3	0.2774	0.0386	0.2106	-0.0739	0.2914	0.0107	0.1088	0.3444	-0.0085	-0.0657
RAMOS--4	0.0659	-0.0214	0.2802	-0.1446	-0.1540	0.2129	-0.1130	-0.0655	0.4190	-0.1128
RAMOS--5	0.0732	0.2756	0.3700	-0.0803	0.0191	0.3025	-0.1035	-0.0995	0.4034	0.0797
RAMOS--6	-0.0875	-0.1398	0.1367	0.4656	0.0319	0.1924	-0.0123	0.2913	0.2027	-0.1681
RAMOS--7	1.0000	-0.1332	0.5048	-0.2497	0.2582	0.1764	0.2620	0.0774	0.4425	0.2455
RAMOS--8	-0.1332	1.0000	0.5457	-0.0905	-0.0808	0.2070	-0.0821	-0.2467	0.2201	0.0309
RAMOS--9	0.5048	0.5457	1.0000	-0.2274	0.1210	0.3697	-0.0990	-0.0724	0.6752	0.1514
RAMOS-10	-0.2497	-0.0905	-0.2274	1.0000	0.2277	0.1723	0.0795	0.4965	-0.3224	-0.0030
RAMOS-11	0.2582	-0.0808	0.1210	0.2277	1.0000	-0.1046	0.2478	0.1915	0.0807	0.3697
RAMOS-12	0.1764	0.2070	0.3697	0.1723	-0.1046	1.0000	-0.1723	0.0329	0.1193	0.0554
RAMOS-13	0.2620	-0.0821	-0.0990	0.0795	0.2478	-0.1723	1.0000	0.0580	0.0753	-0.1339
RAMOS-14	0.0774	-0.2467	-0.0724	0.4965	0.1915	0.0329	0.0580	1.0000	-0.2064	-0.2256
RAMOS-15	0.4425	0.2201	0.6752	-0.3224	0.0807	0.1193	0.0753	-0.2064	1.0000	-0.1050
RAMOS-16	0.2455	0.0309	0.1514	-0.0030	0.3697	0.0554	-0.1339	-0.2256	-0.1050	1.0000
RAMOS-17	-0.0133	0.3039	0.2941	0.0121	-0.2423	0.4258	-0.0810	-0.0238	-0.1066	0.0247
RAMOS-18	-0.0769	0.3893	0.2808	0.4141	0.0671	0.1639	-0.0456	0.1905	-0.0335	-0.0817
RAMOS-19	-0.0157	-0.2280	-0.1585	-0.0997	-0.1551	-0.0945	-0.0717	0.0220	-0.1214	-0.1774
RAMOS-20	-0.2485	-0.0679	-0.1630	0.7160	0.0757	0.1923	-0.1149	0.2319	-0.3418	-0.0897

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Grade 2 Reading (continued)

	RAMOS--7	RAMOS--8	RAMOS--9	RAMOS-10	RAMOS-11	RAMOS-12	RAMOS-13	RAMOS-14	RAMOS-15	RAMOS-16
APPLE--1	-0.2462	-0.2255	-0.0746	0.2125	0.0785	0.0058	0.0567	0.2107	-0.0546	-0.0690
APPLE--2	-0.2465	0.0498	-0.0455	-0.0481	-0.4372	-0.0836	-0.1745	-0.1314	-0.0634	-0.1450
APPLE--3	-0.0283	-0.0244	0.2729	-0.0543	0.0158	0.1168	-0.1663	-0.0991	0.3521	0.1166
APPLE--4	0.1161	0.1403	0.3152	-0.0547	0.1198	0.0335	-0.0865	-0.0145	0.4855	-0.0758
APPLE--5	-0.2125	0.1877	0.1621	0.3070	0.0141	0.0600	0.0416	-0.0428	0.0474	0.1786
APPLE--6	0.0482	0.1214	0.1122	0.0829	-0.0625	0.3012	0.0014	-0.0593	-0.0954	0.0298
APPLE--7	0.1025	-0.0122	0.2277	-0.0904	-0.0717	0.3367	-0.2352	0.0086	0.1927	-0.1074
APPLE--8	0.1682	0.2358	0.2479	-0.0268	-0.0933	0.0852	-0.0221	-0.0587	-0.0009	0.0117
APPLE--9	-0.1341	0.0413	-0.1369	0.0409	-0.0874	-0.0571	-0.1585	0.1784	-0.0505	0.0291
APPLE-10	-0.1054	-0.1070	-0.0358	-0.1017	-0.0410	-0.0157	-0.0469	0.0511	0.0571	-0.0906
APPLE-11	0.2658	0.2589	0.1598	0.0129	0.0536	0.0723	0.4211	-0.0186	0.0706	-0.0269
APPLE-12	-0.2247	0.0524	-0.1591	-0.0607	0.2628	-0.1628	-0.0751	-0.1571	0.0000	0.0167
APPLE-13	0.1388	-0.0616	0.0226	-0.1152	-0.0159	0.2053	-0.0888	0.0005	0.0500	0.2082
APPLE-14	0.0355	0.0079	-0.0203	-0.2388	0.2665	-0.0351	-0.3026	-0.1265	-0.0955	0.0710
APPLE-15	0.0496	-0.1104	-0.1231	0.1104	-0.0403	-0.2247	0.0804	-0.0486	-0.0888	0.2186
APPLE-16	-0.0693	0.0701	0.0133	0.3619	0.1387	0.1200	-0.1567	0.0686	-0.2111	0.1725
APPLE-17	-0.1064	-0.0623	-0.1057	-0.1029	-0.3212	0.0077	-0.0407	-0.1616	-0.0724	-0.1371
APPLE-19	0.1465	0.1467	0.4287	-0.0624	-0.1660	0.3100	-0.2370	0.0980	0.4734	-0.2442
APPLE-20	0.0056	0.0860	0.0420	-0.1234	0.2655	-0.0214	-0.0373	-0.1950	0.0495	0.2464
APPLE-21	-0.1943	-0.1311	-0.2769	-0.0863	-0.0037	-0.0959	-0.1202	0.0857	-0.2810	-0.1828
APPLE-22	-0.0619	0.0002	-0.0774	0.4040	-0.0740	0.0621	-0.1748	0.0342	-0.2509	0.1312
APPLE-23	-0.0726	0.0748	0.1508	0.0497	0.2785	-0.0739	0.1113	0.0041	0.0578	0.1279
APPLE-24	0.1526	-0.1880	0.1240	-0.1063	0.0753	0.0759	-0.0402	-0.0421	0.2881	-0.0875
APPLE-25	-0.1163	-0.1279	0.1588	-0.0187	0.0627	-0.0924	0.0386	-0.0049	0.3108	-0.1396
APPLE-26	0.2213	-0.0832	0.0792	0.1203	-0.0633	0.3651	0.1106	-0.0935	-0.1028	0.0201
APPLE-27	-0.1426	-0.0048	-0.0938	0.0643	-0.1127	-0.0980	-0.0690	0.2520	-0.0956	0.0569
APPLE-28	-0.2258	-0.0116	-0.1247	0.1412	-0.1005	-0.0247	-0.0853	0.1454	-0.1099	0.0054
APPLE-29	0.1236	-0.1526	0.0924	-0.0255	0.0936	-0.0185	-0.1997	-0.1172	0.3670	-0.0118
APPLE-30	0.0556	-0.1373	0.0197	-0.0493	-0.1049	0.2105	-0.1402	0.1887	0.1341	-0.1645

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Grade 2 Reading (continued)

	RAMOS--7	RAMOS--8	RAMOS--9	RAMOS-10	RAMOS-11	RAMOS-12	RAMOS-13	RAMOS-14	RAMOS-15	RAMOS-16
APPLE-31	0.1900	-0.0716	0.0238	-0.0805	-0.0874	0.1191	-0.0658	-0.1413	-0.0415	0.0418
APPLE-32	0.0788	-0.0921	0.0633	-0.0050	-0.0061	-0.0457	0.0252	-0.0457	0.0043	0.0038
APPLE-33	0.0211	0.2980	0.2062	-0.1493	-0.0372	-0.1823	-0.1691	0.0486	0.0172	-0.2445
APPLE-34	0.1787	0.0817	0.2043	-0.1071	-0.2280	0.2342	0.0036	-0.2639	0.1579	0.0730
APPLE-35	0.2261	0.2503	0.2699	-0.0022	0.0852	0.1862	-0.0551	0.0345	0.1496	0.3606
APPLE-36	-0.2205	0.0467	0.1207	-0.0071	-0.3785	0.2123	-0.1827	-0.0766	0.1154	-0.2580
APPLE-37	-0.2697	-0.0716	-0.1992	0.1108	-0.0573	-0.1002	-0.1007	0.1985	-0.1876	-0.0223
APPLE-38	0.0699	-0.0125	-0.0355	0.1752	0.1699	-0.1369	0.0492	0.0429	-0.2040	0.2166
APPLE-39	-0.0602	0.1595	0.1583	-0.1430	0.2799	-0.1022	0.1107	0.0182	0.0443	-0.0285
APPLE-40	-0.0475	0.0838	0.0453	0.0841	0.0940	-0.0905	0.0693	-0.2372	0.0699	0.1502
APPLE-41	-0.1816	0.3128	0.0564	0.1235	0.0624	0.0940	-0.2408	0.0092	-0.0115	0.0187
APPLE-42	-0.1162	-0.0931	-0.2817	0.1917	0.0195	-0.1806	0.2509	-0.0139	-0.2651	-0.1315
APPLE-43	0.3519	-0.1252	0.1126	-0.1156	0.0370	-0.0272	0.2600	-0.0452	0.0486	0.1474
APPLE-44	0.2154	-0.1379	0.0355	-0.1328	0.1420	0.0884	-0.0177	-0.0428	-0.2453	0.5025
APPLE-45	-0.0586	-0.0523	0.0441	-0.1689	-0.2532	0.1302	-0.3321	0.0149	0.1849	-0.1351
APPLE-46	-0.1119	0.0732	0.2523	0.3900	0.2863	0.2347	-0.1238	0.2161	-0.0616	0.1058
APPLE-47	-0.1480	0.0243	-0.1560	0.3433	0.1400	-0.0844	-0.1580	-0.0984	-0.1567	0.1991
APPLE-48	0.0612	-0.1202	-0.1140	-0.0668	-0.1748	0.0018	-0.0852	-0.1840	-0.3125	0.0741
APPLE-49	0.2022	-0.2702	-0.0456	0.0086	-0.0336	0.2339	-0.1302	-0.0441	-0.1071	0.0673
APPLE-50	0.1462	-0.0951	-0.0602	0.2068	-0.0263	0.0246	-0.1453	-0.0791	-0.1619	0.1516
CATRC-GN	-0.3556	-0.1344	-0.3468	0.2066	0.2274	0.0101	-0.1317	0.2057	-0.4154	0.2111
RAPPL-GN	0.0757	-0.1620	-0.0178	0.3006	0.2319	-0.1718	-0.1798	0.3039	-0.1222	0.1435
CECOD-GN	-0.0238	-0.3014	-0.1220	0.5309	0.0705	0.1928	-0.2789	0.4058	-0.2891	0.0284
RACH.-GN	0.1962	-0.3681	-0.1192	0.1131	0.0697	-0.0698	-0.0764	0.3570	-0.0338	-0.1475
TOTRD-GN	-0.0051	-0.2775	-0.2008	0.2972	0.2650	0.0741	-0.1928	0.3828	-0.2989	0.1989

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Grade 2 Reading (continued)

	RAMOS-17	RAMOS-18	RAMOS-19	RAMOS-20	APPLE--1	APPLE--2	APPLE--3	APPLE--4	APPLE--5	APPLE--6
WC-----1	-0.0545	-0.0769	0.1994	-0.1125	0.1268	-0.1395	0.4104	0.0495	0.2021	-0.2287
WC-----2	0.1406	-0.2214	-0.0605	-0.2709	-0.0777	0.0752	0.3497	-0.1191	0.2285	0.1735
WD-----3	-0.0927	-0.1525	-0.0707	0.3380	0.2339	0.0794	-0.1076	-0.1078	-0.2096	-0.0353
WC-----4	0.3924	-0.0767	0.1973	0.0217	0.0630	0.1687	0.0659	-0.0333	0.1464	-0.1349
WC-----5	-0.0503	-0.1413	0.2392	-0.0169	0.1671	0.1483	-0.0431	-0.2355	-0.0559	-0.0989
WD-----6	-0.0168	-0.1248	-0.0781	0.0973	0.0695	0.1761	-0.0928	-0.0582	0.0169	-0.3010
WD-----7	-0.0970	-0.0087	-0.0808	0.0082	-0.1479	0.1487	-0.0813	0.3188	-0.2564	-0.0625
WC-----8	-0.1739	0.0492	-0.1031	0.0872	-0.1577	0.0943	-0.3427	0.0273	-0.2477	-0.1987
WD-----9	0.0357	-0.0374	-0.0642	0.1526	-0.0886	-0.2043	0.1733	-0.1936	0.0943	-0.1665
WD----10	0.0713	-0.0414	-0.1070	0.0331	-0.0569	-0.2112	0.2141	-0.2439	0.1028	0.0630
WC----11	0.0668	0.2265	-0.2158	0.2243	-0.1054	0.0562	0.1913	-0.0843	0.0363	-0.0492
WC----12	0.1127	-0.0721	-0.1324	0.1221	-0.2887	-0.0856	0.4030	-0.0033	0.1199	0.0223
WD----13	0.0776	-0.0529	-0.0297	0.0061	0.1997	0.1445	0.1197	-0.0231	0.2002	0.2514
WC----14	-0.1333	-0.1109	-0.0093	-0.1005	0.2927	0.0246	0.3180	-0.1162	0.2051	0.2786
WC----15	-0.2254	-0.1420	0.1138	-0.0926	0.0367	-0.1158	0.1817	0.1929	0.0300	0.0643
WD----16	-0.0939	0.0379	0.1305	0.1512	0.0472	-0.0094	0.1976	0.1370	0.1754	0.2148
WD----17	0.0122	0.0142	-0.2371	-0.0077	-0.3018	0.0197	-0.1788	0.1264	-0.1872	0.0261
WC----18	0.0333	0.1294	-0.1792	0.0486	-0.1955	-0.1775	-0.1299	-0.1080	-0.1869	-0.0596
WD----19	-0.0261	0.0117	-0.2006	-0.0098	-0.2316	0.0555	-0.2265	0.2893	-0.2018	-0.0136
WD----20	-0.2264	-0.0069	-0.1100	0.0090	-0.1030	0.0939	-0.1928	0.1018	-0.2569	-0.0494
WD----21	0.2321	0.1033	-0.0706	0.1864	-0.3453	0.1646	-0.3303	0.0097	-0.1605	-0.0902
WC----22	-0.0374	0.0838	0.0857	0.1685	-0.3620	-0.0440	-0.3434	0.1252	-0.2357	-0.2669
WD----23	0.0935	-0.1029	0.0022	0.2373	-0.1697	0.1089	-0.1609	-0.2293	-0.2070	0.1964
WC----24	-0.0615	0.0673	0.1624	-0.0334	0.3303	-0.0731	0.0179	-0.0429	0.0202	0.0543
WD----25	0.1616	-0.0925	-0.0827	-0.1511	-0.1650	-0.0004	0.0907	-0.0712	0.3415	0.2189
WD----26	0.0135	-0.0925	-0.1233	-0.1511	-0.2863	0.2247	-0.1228	0.2369	-0.2604	0.0338
WD----27	-0.2129	-0.0879	-0.1184	-0.0796	0.0475	0.0087	0.3030	0.1672	0.1826	-0.1900
WC----28	-0.3135	0.0937	-0.0959	-0.0164	-0.4202	-0.1036	-0.2749	0.0430	-0.3336	-0.0999
WD----29	-0.0584	0.0654	-0.0564	-0.0162	-0.1794	0.0499	-0.1541	0.2156	-0.2223	-0.1236
WD----30	-0.0562	0.0383	-0.1021	0.1336	-0.3554	0.0283	-0.2585	-0.0747	-0.0985	-0.0151
WC----31	0.0007	-0.0173	-0.1247	0.0617	-0.2635	-0.0626	-0.1505	0.2645	-0.2732	-0.0698
WD----32	0.1246	-0.1785	0.0463	0.1708	0.3065	-0.0875	0.2490	-0.0300	0.3379	0.1587
WD----33	-0.1812	0.2021	0.0051	-0.1573	-0.2930	-0.0415	-0.2324	0.0383	-0.0687	-0.1685
WD----34	0.0000	-0.0784	-0.1649	0.0567	-0.3565	-0.1373	-0.0361	-0.2052	-0.0722	-0.1041

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Grade 2 Reading (continued)

	RAMOS-17	RAMOS-18	RAMOS-19	RAMOS-20	APPLE--1	APPLE--2	APPLE--3	APPLE--4	APPLE--5	APPLE--6
RAMOS--1	0.2908	C.1828	-0.2272	-0.3122	-0.2356	-0.0979	0.0366	0.2349	0.0246	-0.1893
RAMOS--2	0.0399	0.4185	-0.2831	-0.2284	-0.2567	0.0055	0.0087	0.3335	0.0557	-0.1647
RAMOS--3	0.2918	-C.2811	0.0969	-0.0805	-0.0962	-0.1517	-0.2677	-0.2025	-0.1263	-0.0952
RAMOS--4	0.0808	-C.0946	0.0255	-0.0857	0.2556	0.0220	0.5349	0.0361	0.0769	0.0175
RAMOS--5	0.2950	-0.1423	-0.1004	-0.1240	0.0489	-0.0858	0.3356	0.1447	0.1510	0.1151
RAMOS--6	-0.1345	0.4506	-0.0682	0.2386	0.3036	-0.0129	0.5014	0.2297	0.2541	-0.0906
RAMOS--7	-0.0133	-C.0769	-0.0157	-0.2485	-0.2462	-0.2465	-0.0283	0.1161	-0.2125	0.0482
RAMOS--8	0.3039	0.3893	-0.2280	-0.0679	-0.2255	0.0498	-0.0244	0.1403	0.1877	0.1214
RAMOS--9	0.2941	0.2808	-0.1585	-0.1630	-0.0746	-0.0455	0.2729	0.3152	0.1621	0.1122
RAMOS-10	0.0121	0.4141	-0.0997	0.7160	0.2125	-0.0481	-0.0543	-0.0547	0.3070	0.0829
RAMOS-11	-0.2423	0.0671	-0.1551	0.0757	0.0785	-0.4372	0.0158	0.1198	0.0141	-0.0625
RAMOS-12	0.4258	0.1639	-0.0945	0.1923	0.0058	-0.0836	0.1168	0.0335	0.0600	0.3012
RAMOS-13	-0.0810	-C.0456	-0.0717	-0.1149	0.0567	-0.1745	-0.1663	-0.0865	0.0416	0.0014
RAMOS-14	-0.0238	0.1905	0.0220	0.2319	0.2107	-0.1314	-0.0991	-0.0145	-0.0428	-0.0593
RAMOS-15	-0.1066	-0.0335	-0.1214	-0.3418	-0.0546	-0.0634	0.3521	0.4855	0.0474	-0.0954
RAMOS-16	0.0247	-0.0817	-0.1774	-0.0897	-0.0690	-0.1450	0.1166	-0.0758	0.1786	0.0298
RAMOS-17	1.0000	-C.1184	-0.1647	0.0625	-0.0358	0.2612	0.0135	-0.2055	0.1552	0.3807
RAMOS-18	-0.1184	1.0000	-0.1110	0.3486	-0.0087	-0.0077	-0.0613	0.1639	0.1290	-0.0578
RAMOS-19	-0.1647	-0.1110	1.0000	-0.0739	0.0106	0.0735	-0.0275	-0.1493	-0.1742	-0.2019
RAMOS-20	0.0625	0.3486	-0.0739	1.0000	0.0955	-0.0067	-0.0966	-0.1541	0.0192	0.2001

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Grade 2 Reading (continued)

	RAMOS-17	RAMOS-18	RAMOS-19	RAMOS-20	APPLE--1	APPLE--2	APPLE--3	APPLE--4	APPLE--5	APPLE--6
APPLE--1	-0.0358	-0.0087	0.0106	0.0955	1.0000	0.0818	0.3807	-0.0914	0.3034	0.0977
APPLE--2	0.2612	-0.0077	0.0735	-0.0067	0.0818	1.0000	0.0035	-0.0828	-0.1689	0.0869
APPLE--3	0.0135	-0.0613	-0.0275	-0.0966	0.3807	0.0035	1.0000	0.1484	0.3691	0.0283
APPLE--4	-0.2055	0.1639	-0.1493	-0.1541	-0.0914	-0.0828	0.1484	1.0000	-0.0431	-0.2807
APPLE--5	0.1552	0.1290	-0.1742	0.0192	0.3034	-0.1689	0.3691	-0.0431	1.0000	0.0727
APPLE--6	0.3807	-0.0578	-0.2019	0.2001	0.0977	0.0869	0.0283	-0.2807	0.0727	1.0000
APPLE--7	-0.0909	0.1068	0.0274	-0.0656	0.0007	-0.2927	0.2117	0.2159	0.0317	-0.2074
APPLE--8	-0.0481	0.4759	0.0057	0.1336	-0.1206	0.1070	-0.1825	-0.0643	0.0055	-0.0940
APPLE--9	-0.0869	-0.1028	0.1954	-0.0046	0.0113	0.1459	0.0016	-0.1977	-0.1042	0.0867
APPLE-10	-0.0735	-0.0637	0.2715	-0.1339	0.3467	0.2094	0.2814	-0.1376	-0.1923	-0.0335
APPLE-11	0.0757	0.0831	-0.0437	-0.0064	-0.0324	-0.0646	-0.0848	-0.0060	0.0762	0.1218
APPLE-12	-0.1051	-0.1151	-0.0334	-0.1021	-0.0256	-0.2621	-0.1844	-0.1188	-0.0054	-0.1570
APPLE-13	-0.0344	-0.1105	-0.1539	-0.1391	0.0214	-0.2598	-0.0853	0.1462	0.0318	0.2368
APPLE-14	-0.1407	-0.0435	0.2797	-0.1088	-0.1495	-0.3806	-0.2760	-0.2155	-0.2405	-0.1247
APPLE-15	0.0551	-0.1201	-0.0496	-0.0626	-0.1063	0.3227	-0.0668	0.1502	0.1684	0.0421
APPLE-16	0.1004	0.3329	-0.1304	0.5067	0.0561	-0.0097	-0.1377	-0.1031	0.0091	0.0167
APPLE-17	0.1010	-0.1210	0.1094	-0.0722	-0.1317	0.2074	-0.0115	0.0716	-0.0092	0.0944
APPLE-19	-0.0411	0.3114	-0.0293	-0.0436	0.1189	0.0355	0.4448	0.3122	-0.0360	0.0367
APPLE-20	-0.0856	-0.1620	0.3686	-0.1518	0.0420	-0.2711	0.0332	0.3117	0.0462	-0.2336
APPLE-21	0.1060	-0.1044	-0.1188	-0.1083	-0.1324	0.0001	-0.2344	0.0509	-0.1850	-0.2061
APPLE-22	-0.0406	0.2599	-0.0389	0.6629	-0.0981	0.0964	-0.0475	-0.2094	-0.1670	0.0974
APPLE-23	-0.0455	-0.0942	0.0360	-0.0509	0.3416	0.0291	0.1580	0.1407	0.4179	0.0936
APPLE-24	-0.2396	0.0188	0.2333	-0.0705	0.1776	-0.2319	0.5980	0.1200	-0.0625	-0.0406
APPLE-25	-0.0504	-0.0129	-0.0619	0.0183	0.5368	0.0657	0.6460	0.0880	0.1878	-0.0666
APPLE-26	0.2993	0.1117	-0.0338	0.1640	0.1008	0.2661	0.0850	-0.2591	-0.0035	0.5528
APPLE-27	-0.0062	-0.0725	-0.0830	-0.0657	0.0638	0.4261	-0.0852	-0.2896	-0.0882	0.1161
APPLE-28	-0.0265	0.0002	-0.0326	0.0465	0.0121	0.4485	-0.1401	-0.2625	-0.1398	0.1453
APPLE-29	-0.2389	0.0134	-0.0847	0.0678	-0.2339	0.0321	0.1591	0.2759	0.0798	0.0497
APPLE-30	-0.1046	0.0288	-0.1137	-0.0836	-0.0188	-0.1633	0.0596	0.3588	-0.2208	-0.1577

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Grade ? Reading (continued)

	RAMOS-17	RAMOS-18	RAMOS-19	RAMOS-20	APPLE--1	APPLE--2	APPLE--3	APPLE--4	APPLE--5	APPLE--6
APPLE-31	0.2293	-0.0988	-0.1378	-0.0531	0.0531	0.3082	0.0549	-0.1199	-0.1140	0.3657
APPLE-32	-0.0561	-0.0725	0.4676	0.0834	0.0459	0.2119	-0.0608	0.1232	0.0193	-0.0889
APPLE-33	-0.1800	0.4773	-0.0154	-0.1245	-0.1892	0.0230	-0.1695	0.0002	-0.1338	-0.0979
APPLE-34	0.2296	-0.0598	-0.0042	-0.1176	0.2652	0.2430	0.3966	-0.2215	0.1728	0.3470
APPLE-35	0.1532	-0.1142	-0.1622	-0.1130	-0.1329	0.0113	0.2882	0.0977	0.2137	0.2883
APPLE-36	0.1072	0.0420	0.0318	0.0908	-0.0291	0.1028	0.2826	0.2481	0.1051	0.0322
APPLE-37	-0.0661	-0.0161	0.1317	0.0419	0.0220	0.3500	-0.0194	-0.3113	-0.1327	0.1060
APPLE-38	-0.0180	-0.0816	0.1209	0.1452	-0.0088	-0.1579	-0.0451	0.0670	0.2369	-0.2505
APPLE-39	0.1300	-0.0283	-0.2331	-0.1366	0.1775	-0.0904	-0.1327	0.0728	0.0030	-0.1908
APPLE-40	-0.0040	-0.1182	-0.1711	0.3555	0.2268	-0.0744	0.2867	-0.0550	0.0741	-0.0498
APPLE-41	0.0288	0.0210	0.0083	0.2641	-0.0817	-0.0407	0.0323	-0.0630	-0.2278	0.0945
APPLE-42	0.1879	-0.0174	0.0880	0.2624	-0.0615	0.2384	-0.0753	-0.2513	-0.0150	0.2161
APPLE-43	0.2139	-0.1578	-0.1038	-0.1148	0.1299	0.2659	0.0353	-0.1943	-0.1520	0.5349
APPLE-44	-0.0105	-0.0029	0.1726	0.0218	0.0469	0.0161	-0.1423	-0.1273	-0.1921	-0.1543
APPLE-45	-0.0538	-0.1292	0.1937	-0.3330	-0.0041	0.0637	0.0076	0.4065	0.0277	-0.1456
APPLE-46	0.2233	0.2686	-0.1758	0.2676	0.2736	-0.0201	0.2603	0.0134	0.3831	0.3101
APPLE-47	-0.2273	0.0364	-0.0927	0.3159	-0.0079	-0.2400	-0.0962	0.1149	0.1329	0.0081
APPLE-48	0.1817	-0.0340	-0.1357	0.0439	-0.0248	0.3113	-0.0748	-0.2347	-0.1262	0.1903
APPLE-49	0.0718	-0.0793	0.2133	-0.0655	0.1326	0.0237	0.1924	-0.0557	0.0699	0.3862
APPLE-50	0.0600	0.0179	0.0338	0.4257	0.0882	0.1754	-0.0385	-0.3225	-0.0744	0.4885
CATRC-GN	-0.1677	-0.0952	-0.2175	0.2249	-0.0042	-0.1738	-0.0967	0.2040	0.0197	-0.0941
RAPPL-GN	-0.0136	0.2285	-0.1791	0.3076	0.2628	-0.1539	0.0238	-0.0605	0.0428	0.0543
DECOD-GN	0.0174	0.1500	0.1312	0.5703	0.0658	0.0337	-0.0062	-0.0029	-0.1462	0.1391
RACH.-GN	-0.1102	0.0484	0.0314	0.1779	-0.2109	-0.0703	-0.0628	0.0623	-0.2311	0.0724
TOTRD-GN	-0.0723	0.0771	-0.1643	0.2939	0.1275	-0.1707	0.0062	-0.0159	-0.0234	0.0430

Grade 2 Reading (continued)

	APPLE--7	APPLE--8	APPLE--9	APPLE-10	APPLE-11	APPLE-12	APPLE-13	APPLE-14	APPLE-15	APPLE-16
WC-----1	0.1719	-0.1078	0.1079	0.3785	0.2145	-0.1298	-0.0824	0.0399	-0.0857	-0.0131
WC-----2	0.0234	-0.2089	-0.0184	-0.0435	-0.0348	0.2061	-0.0775	-0.0788	0.3043	-0.2794
WC-----3	-0.1004	0.0244	0.1781	0.1982	0.0882	-0.1790	-0.0465	-0.2238	-0.2051	0.1850
WC-----4	0.2859	-0.0121	-0.0835	0.1512	0.0617	-0.1841	-0.0706	-0.1731	-0.0968	0.1571
WD-----5	0.0888	0.0015	-0.1445	0.1920	0.0919	0.0991	-0.1034	0.0189	-0.0640	-0.1714
WC-----6	-0.1480	0.0327	-0.1958	0.0698	0.0595	0.0026	-0.0325	-0.0925	0.2444	0.0581
WC-----7	-0.0417	-0.1491	0.0376	0.1367	0.0900	-0.0849	-0.0407	-0.0125	-0.1391	0.0102
WD-----8	-0.0588	0.0510	0.3342	0.2232	0.0095	0.0005	0.0407	0.0066	-0.2926	0.1687
WD-----9	0.1193	0.1048	-0.0327	-0.3192	0.1358	-0.2274	-0.0679	-0.2337	0.1810	0.1973
WD----10	0.1227	0.1499	-0.0718	-0.4569	-0.0526	0.0497	0.0118	-0.1545	0.0990	0.0256
WD----11	0.0359	0.2521	-0.0566	-0.3228	0.0695	-0.2292	-0.1121	-0.3580	-0.0125	0.1884
WD----12	0.0711	0.0248	-0.0689	-0.3639	-0.0622	-0.2949	0.0596	-0.4059	0.1962	-0.0361
WC----13	0.0469	0.0495	0.0939	-0.1929	-0.1032	0.0697	-0.1927	-0.1252	0.0022	-0.0140
WC----14	-0.2047	0.0237	0.2709	0.0533	0.3567	-0.1282	-0.0360	-0.2274	0.0440	-0.0914
WD----15	-0.0849	0.0507	0.2600	-0.0409	0.0086	-0.1328	-0.0336	-0.0830	-0.0265	-0.1337
WD----16	-0.1368	0.0882	0.2333	-0.0469	-0.1692	0.0748	-0.0332	-0.0012	0.1311	-0.0377
WC----17	-0.1297	-0.0204	0.3861	-0.0842	-0.0974	0.1306	0.0366	-0.1197	-0.2983	-0.0751
WD----18	0.1033	-0.0423	0.0748	0.1998	0.0657	0.2623	-0.0655	0.2504	-0.4550	-0.0189
WC----19	-0.0205	-0.0251	0.3998	0.1277	-0.0359	0.1441	0.0735	0.0014	-0.2538	-0.1207
WC----20	-0.0143	-0.0336	0.3506	0.0244	-0.2408	-0.1530	0.0197	-0.2196	-0.1559	-0.0778
WD----21	-0.2211	0.2997	-0.1727	-0.1256	-0.0076	-0.1987	-0.3550	0.0024	0.1218	0.1590
WC----22	-0.1075	0.0202	-0.1858	0.0314	-0.1220	0.1027	-0.2691	0.3259	-0.0334	0.1119
WC----23	-0.0921	-0.0964	0.3604	0.1688	0.0763	-0.1228	-0.0750	0.0050	0.1410	0.2153
WC----24	-0.0985	0.1739	-0.1424	-0.1342	-0.1430	0.1779	-0.1347	0.1709	-0.0253	0.1147
WD----25	-0.2234	0.0221	0.4617	0.0845	0.1539	-0.1588	-0.0014	-0.2412	0.3817	-0.1063
WC----26	0.1050	-0.1479	0.1615	-0.0983	-0.2068	-0.1612	0.0350	-0.2093	0.1914	-0.0768
WC----27	0.1365	-0.1274	-0.0870	0.2254	0.1434	-0.1227	-0.0055	0.0183	0.1066	-0.1535
WD----28	0.0365	-0.0553	0.1546	0.1542	-0.2094	0.1526	0.0674	0.1591	-0.1584	0.0841
WD----29	0.2574	0.0766	0.3246	0.1757	0.0944	-0.2199	0.1058	-0.1055	-0.3477	0.0009
WC----30	-0.1285	-0.0496	0.2892	0.0334	0.0681	-0.0807	0.2181	-0.1025	-0.1782	0.1878
WD----31	0.1604	-0.0363	0.1199	0.2322	0.0912	0.1840	0.1825	0.1388	-0.3756	-0.1070
WC----32	-0.0412	-0.1418	0.1325	0.0351	-0.0565	-0.0271	0.0377	0.0380	0.3077	0.3241
WD----33	-0.0355	0.1226	0.1384	-0.1027	-0.0617	0.1292	0.2731	0.1261	-0.3119	-0.1507
WC----34	-0.1693	0.1909	-0.1469	-0.0109	0.0570	0.1222	0.0720	0.2557	-0.0929	-0.0327

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Grade 2 Reading (continued)

	APPLE--7	APPLE--8	APPLE--9	APPLE-10	APPLE-11	APPLE-12	APPLE-13	APPLE-14	APPLE-15	APPLE-16
RAMOS--1	0.1725	0.1609	-0.0949	0.0143	0.0886	-0.0488	0.1497	0.1083	-0.2656	-0.0806
RAMOS--2	0.2180	0.1443	-0.2041	-0.1890	-0.0222	-0.1646	0.2486	-0.0894	-0.2038	0.0337
RAMOS--3	-0.0227	0.0705	0.0775	0.0981	0.1833	0.1972	-0.1741	0.3391	-0.0537	-0.1069
RAMOS--4	0.0006	-0.0610	0.0784	0.4166	-0.0119	-0.1142	0.0269	-0.0114	-0.1219	-0.1223
RAMOS--5	-0.1206	-0.0310	0.1858	0.2040	0.0104	0.0870	0.0495	-0.0401	-0.0455	-0.1027
RAMOS--6	0.2089	-0.0216	-0.0036	0.2114	-0.1833	-0.0568	-0.1032	-0.2564	-0.1284	0.1060
RAMOS--7	0.1025	0.1662	-0.1341	-0.1054	0.2658	-0.2247	0.1388	0.0355	0.0496	-0.0693
RAMOS--8	-0.0122	0.2358	0.0413	-0.1070	0.2589	0.0524	-0.0616	0.0079	-0.1104	0.0701
RAMOS--9	0.2277	0.2479	-0.1369	-0.0358	0.1598	-0.1591	0.0226	-0.0203	-0.1231	0.0133
RAMOS-10	-0.0904	-0.0268	0.0409	-0.1017	0.0129	-0.0607	-0.1152	-0.2388	0.1104	0.3619
RAMOS-11	-0.0717	-0.0933	-0.0874	-0.0410	0.0536	0.2628	-0.0159	0.2665	-0.0403	0.1387
RAMOS-12	0.3367	0.0852	-0.0571	-0.0157	0.0723	-0.1628	0.2053	-0.0351	-0.2247	0.1200
RAMOS-13	-0.2352	-0.0221	-0.1585	-0.0469	0.4211	-0.0751	-0.0888	-0.3026	0.0804	-0.1567
RAMOS-14	0.0086	-0.0587	0.1784	0.0511	-0.0186	-0.1571	0.0005	-0.1265	-0.0486	0.0686
RAMOS-15	0.1927	-0.0009	-0.0505	0.0571	0.0706	0.0000	0.0500	-0.0955	-0.0888	-0.2111
RAMOS-16	-0.1074	0.0117	0.0291	-0.0906	-0.0269	0.0167	0.2082	0.0710	0.2186	0.1725
RAMOS-17	-0.0909	-0.0481	-0.0869	-0.0735	0.0757	-0.1051	-0.0344	-0.1407	0.0551	0.1004
RAMOS-18	0.1068	0.4759	-0.1028	-0.0637	0.0831	-0.1151	-0.1105	-0.0435	-0.1201	0.3329
RAMOS-19	0.0274	0.0057	0.1954	0.2715	-0.0437	-0.0334	-0.1539	0.2797	-0.0496	-0.1304
RAMOS-20	-0.0656	0.1336	-0.0046	-0.1339	-0.0064	-0.1021	-0.1391	-0.1088	-0.0626	0.5067

Grade 2 Reading (continued)

	APPLE--7	APPLE--8	APPLE--9	APPLE-10	APPLE-11	APPLE-12	APPLE-13	APPLE-14	APPLE-15	APPLE-16
APPLE--1	0.0007	-0.1206	0.0113	0.3467	-0.0324	-0.0256	0.0214	-0.1495	-0.1063	0.0561
APPLE--2	-0.2927	0.1070	0.1459	0.2094	-0.0646	-0.2621	-0.2598	-0.3806	0.3227	-0.0097
APPLE--3	0.2117	-0.1825	0.0016	0.2814	-0.0848	-0.1844	-0.0853	-0.2760	-0.0668	-0.1377
APPLE--4	0.2159	-0.0643	-0.1977	-0.1376	-0.0060	-0.1188	0.1462	-0.2155	0.1502	-0.1031
APPLE--5	0.0317	0.0055	-0.1042	-0.1923	0.0762	-0.0054	0.0318	-0.2405	0.1684	0.0091
APPLE--6	-0.2074	-0.0940	0.0867	-0.0335	0.1218	-0.1570	0.2368	-0.1247	0.0421	0.0167
APPLE--7	1.0000	-0.0277	-0.2611	-0.0820	0.0020	-0.0730	-0.0370	0.1073	-0.3572	0.0477
APPLE--8	-0.0277	1.0000	-0.0215	-0.0492	0.3561	-0.1710	-0.1174	-0.0707	0.0325	0.0666
APPLE--9	-0.2611	-0.0215	1.0000	0.3762	-0.1263	-0.0932	0.0155	-0.0829	-0.0757	0.1062
APPLE-10	-0.0820	-0.0492	0.3762	1.0000	0.0725	-0.0672	-0.1491	0.1605	-0.3249	-0.0680
APPLE-11	0.0020	0.3561	-0.1263	0.0725	1.0000	-0.1926	0.0030	-0.1324	0.0462	-0.1288
APPLE-12	-0.0730	-0.1710	-0.0932	-0.0672	-0.1926	1.0000	-0.0493	0.6743	-0.0956	-0.2029
APPLE-13	-0.0370	-0.1174	0.0155	-0.1491	0.0030	-0.0493	1.0000	0.0178	-0.0656	-0.0831
APPLE-14	0.1073	-0.0707	-0.0829	0.1605	-0.1324	0.6743	0.0178	1.0000	-0.3232	-0.0428
APPLE-15	-0.3572	0.0325	-0.0757	-0.3249	0.0462	-0.0956	-0.0656	-0.3232	1.0000	-0.0102
APPLE-16	0.0477	0.0666	0.1062	-0.0680	-0.1288	-0.2029	-0.0831	-0.0428	-0.0102	1.0000
APPLE-17	-0.0440	-0.0960	-0.2726	-0.1160	-0.0094	-0.1141	-0.1509	-0.1722	0.3578	-0.0851
APPLE-19	0.3177	0.2636	0.0312	0.1174	-0.0633	-0.0849	-0.0621	-0.1128	-0.1664	-0.1228
APPLE-20	0.0686	-0.0782	0.0615	-0.0496	0.0857	0.1651	0.2283	0.1787	0.0737	-0.0948
APPLE-21	0.1629	-0.0181	-0.2046	0.1459	0.1201	-0.0393	-0.0795	0.2039	-0.0908	-0.0478
APPLE-22	0.0403	0.1618	0.2946	0.0832	-0.0371	-0.1876	-0.1124	-0.0842	-0.1061	0.5604
APPLE-23	-0.1473	-0.0208	-0.2341	-0.3170	0.1516	0.0150	0.0382	-0.1400	0.5014	-0.0840
APPLE-24	0.2148	0.0196	0.1058	0.2983	-0.0134	-0.1495	-0.0265	0.0269	-0.1640	-0.0686
APPLE-25	-0.0228	-0.0248	-0.0045	0.4941	-0.0144	-0.0888	-0.1161	-0.1874	-0.1999	-0.0926
APPLE-26	-0.1872	0.1769	-0.1931	0.1345	0.1779	-0.2128	-0.0904	-0.1230	0.0902	0.0010
APPLE-27	-0.1517	-0.0968	0.6545	0.3185	-0.0585	-0.0944	-0.0935	-0.1821	0.0583	0.1711
APPLE-28	-0.1267	0.0031	0.6297	0.3584	-0.1260	-0.0818	-0.1251	-0.1731	0.0286	0.2007
APPLE-29	0.0894	-0.0910	-0.0089	-0.2397	-0.2794	-0.0535	0.0033	-0.0607	0.2452	0.0940
APPLE-30	0.4789	-0.1098	-0.1361	0.2674	0.0590	-0.0953	0.0921	0.0917	-0.2415	-0.1610

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Grade 2 Reading (continued)

	APPLE--7	APPLE--8	APPLE--9	APPLE-10	APPLE-11	APPLE-12	APPLE-13	APPLE-14	APPLE-15	APPLE-16
APPLE-31	-0.1245	-0.0717	-0.1916	0.2587	-0.0187	-0.0744	-0.0942	0.0384	-0.0505	-0.1785
APPLE-32	-0.0823	0.1380	-0.1599	-0.0278	0.1606	-0.0970	-0.0303	0.0083	0.2049	0.0406
APPLE-33	0.2104	0.4919	-0.1175	-0.1137	0.1027	-0.0063	-0.1183	0.1759	-0.1979	-0.1108
APPLE-34	-0.0142	0.0431	-0.0997	0.3915	0.2012	-0.2014	-0.0924	-0.0909	-0.0390	-0.1387
APPLE-35	-0.0574	0.0460	0.1831	-0.1841	0.1898	-0.1401	0.0881	-0.2442	0.4640	-0.1559
APPLE-36	0.2276	0.0422	-0.1980	-0.1397	-0.2740	-0.1601	-0.1138	-0.3057	0.1828	0.0228
APPLE-37	-0.1889	-0.0892	0.7398	0.4993	-0.1681	-0.0559	-0.1492	-0.0700	-0.0234	0.1791
APPLE-38	-0.0346	-0.0093	0.0384	-0.3507	0.0959	-0.1243	-0.1744	-0.1227	0.2805	0.2873
APPLE-39	0.1283	-0.0314	-0.2936	0.0297	0.0553	0.3592	-0.0468	0.2867	0.0028	0.1440
APPLE-40	-0.1242	0.0564	0.0245	0.1980	0.1766	0.1544	-0.1661	0.0046	-0.0736	0.1407
APPLE-41	0.0927	-0.0462	0.4530	0.1226	0.0034	0.2487	-0.1724	0.1755	-0.1674	0.1566
APPLE-42	-0.2649	0.2909	0.1544	0.0349	0.4322	-0.1275	-0.1767	-0.2103	0.2324	-0.0039
APPLE-43	-0.2711	-0.0083	0.0918	0.2106	0.2086	-0.1441	-0.1048	-0.1852	0.1221	-0.1745
APPLE-44	-0.0347	0.2716	-0.0914	0.0302	-0.0311	-0.0650	0.0907	0.1476	0.0497	0.3472
APPLE-45	0.1484	-0.0626	0.2676	0.2073	0.0378	-0.0113	0.3454	0.0379	-0.0347	-0.1601
APPLE-46	0.2527	-0.1165	-0.2082	-0.3073	-0.2439	-0.1647	-0.1504	-0.1787	0.0797	0.3052
APPLE-47	0.1499	-0.1745	-0.2378	-0.2516	-0.0085	0.2174	0.0919	0.1845	0.1829	0.0087
APPLE-48	-0.0986	0.0640	-0.3742	0.0308	-0.0449	0.0082	-0.2174	0.0619	0.2267	-0.0629
APPLE-49	0.0313	-0.0079	-0.0670	-0.0264	-0.0894	-0.0720	0.2245	0.0142	0.0887	-0.2295
APPLE-50	-0.3274	0.2874	0.2157	0.0315	-0.0633	-0.0914	-0.0396	-0.0362	0.1544	0.2352
CATRC-GN	0.0200	-0.1310	0.0014	-0.2543	-0.2208	-0.1037	0.2616	-0.1483	0.1288	0.1105
RAPPL-GN	0.0757	0.0370	0.0037	-0.2553	-0.1898	-0.1420	0.2251	-0.0624	-0.1339	0.5155
CECOC-GN	0.2292	-0.1633	0.0402	-0.0497	-0.1870	-0.2412	0.1049	-0.0979	0.0019	0.4884
RACH.-GN	0.0436	-0.0897	-0.0618	-0.2342	-0.1192	-0.2055	0.4219	-0.0372	0.0790	0.1066
TOTRD-GN	0.0118	-0.0685	-0.0364	-0.3421	-0.2316	-0.2056	0.2831	-0.0780	0.1114	0.4176

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Grade 2 Reading (continued)

	APPLE-17	APPLE-19	APPLE-20	APPLE-21	APPLE-22	APPLE-23	APPLE-24	APPLE-25	APPLE-26	APPLE-27
WC-----1	-0.1324	0.0454	0.0397	0.4791	-0.1059	0.0042	0.2151	-0.0491	-0.1660	0.0370
WC-----2	0.1013	-0.1542	0.1677	-0.1833	-0.2405	0.1789	0.0201	-0.1914	0.1010	0.1576
WC-----3	-0.1675	0.0603	-0.2687	-0.0124	0.3791	-0.3498	-0.2445	0.2778	0.0085	0.2217
WC-----4	0.0042	-0.0614	0.0228	0.0897	0.0944	-0.0172	-0.1511	0.0061	-0.1757	0.1318
WC-----5	-0.0446	-0.0774	-0.0299	-0.0024	-0.0645	-0.1473	-0.2443	-0.0074	0.0739	0.0930
WC-----6	-0.1565	-0.1673	-0.1122	0.3308	-0.0408	-0.0860	-0.4140	-0.1433	-0.0955	-0.0128
WC-----7	-0.0326	0.0824	-0.0810	0.0136	0.1511	-0.1171	0.1950	-0.1485	-0.1581	0.1897
WC-----8	-0.1968	0.1241	-0.2484	-0.0194	0.4211	-0.5008	-0.2485	-0.0528	-0.3516	0.3550
WC-----9	0.0976	-0.1060	0.0245	-0.1477	0.1020	0.2004	0.1204	0.1113	0.0702	-0.1500
WC----10	0.1098	0.2693	-0.0893	-0.3125	0.1021	0.1411	0.1408	0.1615	0.0778	-0.1921
WC----11	0.1473	0.0515	-0.0555	-0.0795	0.1650	0.0531	-0.1764	0.1184	0.1375	-0.0932
WC----12	0.1538	0.0851	-0.0403	-0.0282	0.0345	0.1218	0.0617	-0.0238	0.0747	-0.2127
WC----13	-0.0106	0.2866	-0.0588	-0.1844	-0.1182	0.2187	-0.0633	0.2283	-0.0355	-0.0226
WC----14	-0.0267	0.1135	-0.0082	-0.1498	-0.1631	0.3045	0.0500	0.2918	0.0822	0.1138
WC----15	-0.0868	0.3167	-0.0423	-0.1792	-0.0156	0.0812	0.4352	0.1129	-0.0684	-0.0170
WC----16	-0.1402	0.3526	0.0318	-0.2501	0.1121	0.1037	0.3420	-0.0494	-0.0887	-0.0855
WC----17	-0.2770	0.3370	-0.1653	-0.2478	0.1818	-0.4768	-0.1794	-0.1855	-0.2607	0.2390
WC----18	-0.1952	0.3351	-0.3557	0.0069	0.1902	-0.5625	-0.1657	-0.1987	-0.1300	0.1213
WC----19	-0.1355	0.3242	-0.0765	-0.0503	0.1740	-0.4305	-0.2163	-0.1866	-0.2549	0.2351
WC----20	0.0718	0.2414	-0.3093	-0.1075	0.2571	-0.4492	-0.2353	-0.1030	-0.2198	0.2550
WC----21	0.0208	-0.0151	-0.1436	0.2319	0.1024	-0.1982	-0.2448	-0.1363	0.1908	-0.1730
WC----22	0.0738	-0.1181	0.0296	0.1907	0.0563	-0.2339	-0.3091	-0.1794	0.0304	-0.2405
WC----23	-0.0714	0.0019	-0.2823	-0.1305	0.5679	-0.1509	0.1837	0.0461	-0.0932	0.5195
WC----24	-0.0724	-0.0733	0.2596	-0.3839	-0.2289	0.3075	0.2540	0.2225	0.1139	-0.2132
WC----25	-0.1380	0.1065	-0.1292	-0.1389	0.0078	0.0338	0.0988	-0.0684	0.0364	0.3427
WC----26	0.1292	0.2467	-0.2857	0.3479	-0.0109	-0.1263	-0.1173	-0.0684	-0.1681	0.2997
WC----27	-0.0954	-0.0877	0.0346	0.2239	-0.1183	0.1337	-0.2231	-0.0964	-0.1357	-0.0026
WC----28	0.0749	0.2268	-0.3140	-0.0606	0.3212	-0.5747	-0.0838	-0.1915	-0.2238	0.1300
WC----29	-0.0318	0.2477	-0.0553	-0.0497	0.2729	-0.4846	0.0465	-0.1678	-0.1506	0.2371
WC----30	-0.1264	-0.1366	-0.1218	-0.0737	0.4606	-0.4500	-0.1813	-0.1336	-0.1965	0.1843
WC----31	-0.2055	0.3202	-0.0410	0.0535	0.2569	-0.5205	-0.1884	-0.0486	-0.1882	0.0276
WC----32	-0.1773	-0.3584	0.4519	-0.2144	0.1262	0.3278	0.1616	-0.1311	0.0250	-0.0133
WC----33	0.0407	0.0969	-0.1254	-0.2182	-0.0713	-0.2784	-0.0684	-0.0600	-0.0820	-0.0651
WC----34	-0.2710	0.0616	-0.2253	0.1604	0.0992	-0.2344	-0.3083	-0.1017	-0.0553	-0.2386

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Grade 2 Reading (continued)

	APPLE-17	APPLE-19	APPLE-20	APPLE-21	APPLE-22	APPLE-23	APPLE-24	APPLE-25	APPLE-26	APPLE-27
RAMOS--1	-0.3395	0.2786	-0.0535	0.1147	-0.0233	-0.2137	-0.0334	0.0311	-0.2261	-0.0156
RAMOS--2	-0.1592	0.1601	-0.0373	-0.0323	0.0520	-0.2348	-0.0852	-0.1770	-0.1787	-0.0467
RAMOS--3	-0.2432	-0.0697	-0.0181	0.3059	-0.0622	0.0235	-0.2348	-0.0963	-0.1414	0.0985
RAMOS--4	-0.0452	0.4471	-0.1507	-0.0961	-0.0120	0.0314	0.6340	0.7280	0.1056	-0.0340
RAMOS--5	-0.1497	0.3218	0.1456	-0.0849	-0.1692	-0.0491	0.2191	0.4617	0.0330	-0.1144
RAMOS--6	-0.1458	0.5674	-0.2772	-0.1603	0.2656	-0.1445	0.3637	0.5118	0.0181	0.0551
RAMOS--7	-0.1064	0.1465	0.0056	-0.1943	-0.0619	-0.0726	0.1526	-0.1163	0.2213	-0.1426
RAMOS--8	-0.0623	0.1467	0.0860	-0.1311	0.0002	0.0748	-0.1880	-0.1279	-0.0832	-0.0048
RAMOS--9	-0.1057	0.4287	0.0420	-0.2769	-0.0774	0.1508	0.1240	0.1588	0.0792	-0.0938
RAMOS-10	-0.1029	-0.0624	-0.1234	-0.0863	0.4040	0.0497	-0.1063	-0.0187	0.1203	0.0643
RAMOS-11	-0.3212	-0.1660	0.2655	-0.0037	-0.0740	0.2785	0.0753	0.0627	-0.0633	-0.1127
RAMOS-12	0.0077	0.3100	-0.0214	-0.0959	0.0621	-0.0739	0.0759	-0.0924	0.3651	-0.0980
RAMOS-13	-0.0407	-0.2370	-0.0373	-0.1202	-0.1748	0.1113	-0.0402	0.0386	0.1106	-0.0690
RAMOS-14	-0.1616	0.0980	-0.1950	0.0857	0.0342	0.0041	-0.0421	-0.0049	-0.0935	0.2520
RAMOS-15	-0.0724	0.4734	0.0495	-0.2810	-0.2509	0.0578	0.2881	0.3108	-0.1028	-0.0956
RAMOS-16	-0.1371	-0.2442	0.2464	-0.1828	0.1312	0.1279	-0.0875	-0.1396	0.0201	0.0569
RAMOS-17	0.1010	-0.0411	-0.0856	0.1060	-0.0406	-0.0455	-0.2396	-0.0504	0.2993	-0.0062
RAMOS-18	-0.1210	0.3114	-0.1620	-0.1044	0.2599	-0.0942	0.0188	-0.0129	0.1117	-0.0725
RAMOS-19	0.1094	-0.0293	0.3686	-0.1188	-0.0389	0.0360	0.2333	-0.0619	-0.0338	-0.0830
RAMOS-20	-0.0722	-0.0436	-0.1518	-0.1083	0.6629	-0.0509	-0.0705	0.0183	0.1640	-0.0657

LOTS

Grade 2 Reading (continued)

	APPLE-17	APPLE-19	APPLE-20	APPLE-21	APPLE-22	APPLE-23	APPLE-24	APPLE-25	APPLE-26	APPLE-27
APPLE--1	-0.1317	0.1189	0.0420	-0.1324	-0.0981	0.3416	0.1776	0.5368	0.1008	0.0638
APPLE--2	0.2074	0.0355	-0.2711	0.0001	0.0964	0.0291	-0.2319	0.0657	0.2661	0.4261
APPLE--3	-0.0115	0.4448	0.0332	-0.2344	-0.0475	0.1580	0.5980	0.6460	0.0850	-0.0852
APPLE--4	0.0716	0.3122	0.3117	0.0509	-0.2094	0.1407	0.1200	0.0880	-0.2591	-0.2896
APPLE--5	-0.0092	-0.0360	0.0462	-0.1850	-0.1670	0.4179	-0.0625	0.1878	-0.0035	-0.0882
APPLE--6	0.0944	0.0367	-0.2336	-0.2061	0.0974	0.0936	-0.0406	-0.0666	0.5528	0.1161
APPLE--7	-0.0440	0.3177	0.0686	0.1629	0.0403	-0.1473	0.2148	-0.0228	-0.1872	-0.1517
APPLE--8	-0.0960	0.2636	-0.0782	-0.0181	0.1618	-0.0208	0.0196	-0.0248	0.1769	-0.0968
APPLE--9	-0.2726	0.0312	0.0615	-0.2046	0.2946	-0.2341	0.1058	-0.0045	-0.1931	0.6545
APPLE-10	-0.1160	0.1174	-0.0496	0.1459	0.0832	-0.3170	0.2983	0.4941	0.1345	0.3185
APPLE-11	-0.0094	-0.0633	0.0857	0.1201	-0.0371	0.1516	-0.0134	-0.0144	0.1779	-0.0585
APPLE-12	-0.1141	-0.0849	0.1651	-0.0393	-0.1876	0.0150	-0.1495	-0.0888	-0.2128	-0.0944
APPLE-13	-0.1509	-0.0621	0.2283	-0.0795	-0.1124	0.0382	-0.0265	-0.1161	-0.0904	-0.0935
APPLE-14	-0.1722	-0.1128	0.1787	0.2039	-0.0842	-0.1400	0.0269	-0.1874	-0.1230	-0.1821
APPLE-15	0.3578	-0.1664	0.0737	-0.0906	-0.1061	0.5014	-0.1640	-0.1999	0.0902	0.0583
APPLE-16	-0.0851	-0.1228	-0.0948	-0.0478	0.5604	-0.0840	-0.0686	-0.0926	0.0010	0.1711
APPLE-17	1.0000	-0.2042	0.0573	-0.1072	-0.1915	0.2759	-0.0723	-0.0646	0.3656	-0.1045
APPLE-19	-0.2042	1.0000	-0.2999	-0.1104	0.1088	-0.1635	0.3677	0.3889	-0.0276	-0.0669
APPLE-20	0.0573	-0.2999	1.0000	-0.2223	-0.2369	0.3175	0.1560	-0.0838	-0.2779	-0.2887
APPLE-21	-0.1072	-0.1104	-0.2223	1.0000	-0.2013	-0.2408	-0.1883	-0.0956	-0.1224	-0.0978
APPLE-22	-0.1915	0.1088	-0.2369	-0.2013	1.0000	-0.3615	0.0481	0.0318	-0.0618	0.3173
APPLE-23	0.2759	-0.1635	0.3175	-0.2408	-0.3615	1.0000	0.0404	0.0600	0.0397	-0.1024
APPLE-24	-0.0723	0.3677	0.1560	-0.1883	0.0481	0.0404	1.0000	0.5172	0.0426	-0.1384
APPLE-25	-0.0646	0.3889	-0.0838	-0.0956	0.0318	0.0600	0.5172	1.0000	0.0428	-0.0448
APPLE-26	0.3656	-0.0276	-0.2779	-0.1224	-0.0618	0.0397	0.0426	0.0428	1.0000	-0.1432
APPLE-27	-0.1045	-0.0669	-0.2887	-0.0978	0.3173	-0.1024	-0.1384	-0.0448	-0.1432	1.0000
APPLE-28	-0.0988	-0.0188	-0.2902	-0.0950	0.4144	-0.1955	-0.1392	-0.0193	-0.0820	0.9114
APPLE-29	-0.1006	0.2270	-0.1698	-0.0524	-0.0429	0.0948	0.0820	-0.1070	-0.0132	-0.1158
APPLE-30	-0.1236	0.3017	-0.1794	0.5596	-0.0354	-0.3657	0.0049	-0.0760	-0.1885	-0.0651

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Grade 2 Reading (continued)

	APPLE-17	APPLE-19	APPLE-20	APPLE-21	APPLE-22	APPLE-23	APPLE-24	APPLE-25	APPLE-26	APPLE-27
APPLE-31	0.2077	-0.1605	-0.2261	0.0489	-0.1482	-0.2090	-0.1370	-0.0715	0.6916	-0.0695
APPLE-32	-0.0424	-0.1062	0.1680	-0.0618	-0.0472	0.3006	-0.0519	-0.0715	0.0804	-0.0688
APPLE-33	-0.1578	0.3669	-0.2978	0.2762	0.0048	-0.1488	-0.0288	-0.0534	-0.1023	-0.1114
APPLE-34	0.2024	0.1180	-0.2455	-0.1027	-0.1271	-0.0297	0.1530	0.2522	0.7122	-0.0852
APPLE-35	-0.1578	0.2372	-0.0153	-0.1284	-0.0609	0.2790	0.0662	-0.1168	0.0232	0.1218
APPLE-36	0.5964	0.3065	-0.0670	-0.1871	0.0398	0.2199	0.1619	0.0685	0.0554	-0.1195
APPLE-37	-0.1204	-0.0922	-0.1228	-0.1048	0.3606	-0.2145	0.0277	0.0390	-0.1223	0.8701
APPLE-38	0.1297	-0.3826	0.4120	-0.2122	0.0988	0.3822	0.0360	-0.0910	-0.1407	-0.1641
APPLE-39	-0.0555	-0.1329	0.0433	0.2672	-0.2493	0.2443	-0.2657	-0.0371	-0.0452	-0.1192
APPLE-40	-0.1474	0.1062	0.0438	-0.1706	0.4364	0.0136	0.1901	0.5251	-0.0202	-0.0748
APPLE-41	-0.2514	0.1310	0.0681	-0.0462	0.4396	-0.1792	0.0466	-0.1883	-0.2787	0.3372
APPLE-42	-0.0911	0.0044	-0.1185	0.2335	0.2336	-0.0173	-0.0385	0.0059	0.1171	0.0677
APPLE-43	0.1817	-0.1496	-0.1581	-0.2197	-0.1069	0.0076	0.0006	-0.0064	0.6741	0.1743
APPLE-44	-0.1123	-0.1496	0.1490	-0.0998	0.1940	0.0927	0.0325	-0.0686	0.0558	-0.0277
APPLE-45	0.1207	0.0996	0.2930	0.0759	-0.1700	0.0038	0.2002	0.1064	-0.1898	0.1369
APPLE-46	-0.0046	0.0404	-0.1065	-0.0990	-0.0386	0.4354	0.0947	-0.0132	0.2459	-0.0697
APPLE-47	0.1268	-0.1076	0.1890	0.0328	0.2619	0.1519	-0.1990	-0.1593	-0.1903	-0.1508
APPLE-48	0.5538	-0.2443	-0.2386	0.1062	-0.0462	-0.0177	-0.2644	-0.1350	0.6586	-0.1450
APPLE-49	-0.0005	0.0802	0.1826	-0.2130	-0.1215	-0.0052	0.1102	-0.1401	0.3751	-0.1609
APPLE-50	-0.1046	0.0742	-0.1343	-0.3033	0.4270	-0.1012	-0.0671	-0.1247	0.4167	0.0055
CATRC-GN	-0.0987	-0.1688	0.1013	0.2778	0.0542	0.2063	-0.1953	-0.0723	-0.2769	-0.0526
RAPPL-GN	-0.1136	-0.0725	0.0370	-0.0597	0.1113	0.0933	0.1080	-0.0974	0.0821	-0.0116
DECOD-GN	0.1854	-0.0894	0.0393	-0.1006	0.4644	-0.0143	0.1165	-0.0480	0.1825	0.1348
RACH.-GN	-0.0097	0.0067	-0.1601	0.1198	0.0712	-0.0185	0.1330	-0.1863	0.0614	-0.0988
TOTRD-GN	-0.1077	-0.0837	-0.0504	0.1573	0.1091	0.2182	0.0883	-0.1756	-0.0305	-0.0219

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Grade 2 Reading (continued)

	APPLE-28	APPLE-29	APPLE-30	APPLE-31	APPLE-32	APPLE-33	APPLE-34	APPLE-35	APPLE-36	APPLE-37
WD-----1	-0.0714	0.0318	0.5179	-0.0759	0.0670	-0.1081	0.0953	0.1378	0.0430	0.0737
WD-----2	0.0900	-0.0194	-0.1794	0.1558	0.0349	-0.2202	0.1429	0.3893	0.0885	0.2345
WD-----3	0.1581	-0.1226	0.1166	0.1946	-0.0293	-0.1004	0.0703	-0.1741	-0.1874	0.0565
WD-----4	0.0991	-0.1419	0.1976	-0.1236	0.2628	-0.1709	-0.0117	-0.0280	0.3125	0.0745
WD-----5	0.0288	-0.1665	0.0888	0.2212	0.3579	-0.2031	0.2316	0.0691	-0.1865	0.0094
WD-----6	-0.0545	0.0821	0.2814	0.0571	0.2503	-0.2065	0.0330	0.0790	-0.1991	-0.0779
WD-----7	0.1809	-0.0338	0.1833	0.1439	0.0824	-0.0542	-0.0927	-0.0759	-0.0031	0.1114
WD-----8	0.3929	-0.1680	0.1656	-0.0635	-0.1068	0.2261	-0.2040	-0.2459	-0.1438	0.2721
WD-----9	-0.2613	0.0931	-0.1878	-0.2997	-0.1505	-0.1062	0.0526	0.1763	0.1164	-0.2190
WD----10	-0.2515	0.0845	-0.2950	-0.2688	-0.3540	0.0917	0.0891	0.2256	0.3015	-0.2846
WD----11	-0.1505	-0.0608	-0.1416	-0.1192	-0.1774	0.1650	-0.0510	0.1053	0.1779	-0.1153
WD----12	-0.2324	0.2657	-0.0445	-0.2175	-0.2155	-0.0470	0.0431	0.3441	0.3767	-0.1793
WD----13	-0.0147	0.3048	-0.1300	-0.0199	-0.1020	0.1354	-0.0552	0.0761	0.2087	-0.0855
WD----14	-0.0907	0.1420	-0.0801	0.0127	-0.0775	-0.0409	0.2237	0.3491	-0.0893	-0.0174
WD----15	-0.0904	0.3489	0.0266	-0.0548	-0.0965	-0.0252	0.1406	0.1394	0.0554	-0.1226
WD----16	0.0054	0.3425	-0.0456	-0.0670	0.0447	-0.0508	0.0875	0.3282	0.2305	0.0176
WD----17	0.2297	-0.0511	-0.0155	-0.0781	-0.1905	0.0532	-0.2189	0.0342	-0.1278	0.1559
WD----18	0.0569	-0.1129	0.3586	0.0312	-0.2976	0.0918	0.0247	-0.1459	-0.0906	0.0228
WD----19	0.2258	-0.0565	0.2629	0.0151	-0.2396	0.0857	-0.1689	0.0020	-0.0334	0.1508
WD----20	0.2371	-0.0313	0.2778	0.0044	-0.2385	0.1246	-0.1727	-0.1352	0.1130	0.1387
WD----21	-0.1813	-0.0394	-0.1187	0.2579	0.1167	0.0756	-0.0136	-0.0446	-0.1699	-0.1860
WD----22	-0.2270	0.0364	0.0399	0.2114	0.1423	0.0110	-0.1394	-0.2712	-0.1879	-0.1060
WD----23	0.4577	0.0393	-0.0904	-0.1147	-0.0881	-0.1491	-0.0118	0.1189	-0.0397	0.4433
WD----24	-0.2002	0.1441	-0.4127	0.0882	0.2198	-0.0685	0.0044	-0.2000	-0.0560	-0.1755
WD----25	0.2766	0.1295	-0.1390	-0.0880	-0.2049	-0.1814	0.2014	0.6230	-0.1017	0.2867
WD----26	0.2538	0.2042	0.2187	-0.1375	-0.1217	0.1734	-0.2792	0.1913	0.1992	0.2510
WD----27	-0.0719	0.3177	0.4231	0.1731	-0.0287	-0.0733	0.2297	0.2552	-0.1381	-0.0823
WD----28	0.1782	0.1034	0.2520	-0.0845	-0.2952	0.1203	-0.1579	-0.1933	0.1389	0.1420
WD----29	0.2427	-0.1777	0.2649	0.0340	-0.2204	0.1330	0.0053	-0.1519	-0.0402	0.1323
WD----30	0.1896	-0.0259	-0.1066	-0.1270	-0.1694	0.0574	-0.1485	-0.1915	-0.1478	0.2194
WD----31	0.1525	-0.1432	0.3503	0.0602	-0.0975	0.1036	-0.0533	-0.0780	-0.0604	0.0361
WD----32	-0.0422	0.1626	-0.2283	0.0858	0.2163	-0.5498	0.1232	0.2323	-0.1104	0.0612
WD----33	-0.0173	0.0368	-0.1385	-0.0537	-0.1395	0.3414	-0.0325	-0.2533	-0.0763	-0.0752
WD----34	-0.2421	0.1493	0.0256	0.1085	-0.0382	0.1914	0.1331	0.1391	-0.2147	-0.2572

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Grade 2 Reading (continued)

	APPLE-28	APPLE-29	APPLE-30	APPLE-31	APPLE-32	APPLE-33	APPLE-34	APPLE-35	APPLE-36	APPLE-37
RAMOS--1	-0.1034	-0.1309	0.2515	-0.0245	-0.1237	0.3109	-0.0082	0.0637	-0.1116	-0.1730
RAMOS--2	-0.1297	0.0161	0.2360	0.0874	-0.1639	0.3041	-0.0211	-0.0608	0.0086	-0.2054
RAMOS--3	0.0793	-0.2669	0.1004	-0.1022	0.1257	0.1248	-0.1727	0.0845	-0.2130	0.0551
RAMOS--4	-0.0522	0.0928	-0.0439	-0.0968	-0.1294	-0.1245	0.3760	0.0592	0.0922	-0.0136
RAMOS--5	-0.0742	-0.0350	-0.1321	-0.1247	-0.0615	-0.1421	0.1479	0.2946	-0.0656	-0.0290
RAMOS--6	0.1390	0.0647	0.2303	-0.1486	-0.0298	0.0786	0.0001	-0.0085	0.2687	0.1518
RAMOS--7	-0.2258	0.1236	0.0556	0.1900	0.0788	0.0211	0.1787	0.2261	-0.2205	-0.2697
RAMOS--8	-0.0116	-0.1526	-0.1373	-0.0716	-0.0921	0.2980	0.0812	0.2503	0.0467	-0.0716
RAMOS--9	-0.1247	0.0924	0.0197	0.0238	0.0633	0.2062	0.2043	0.2699	0.1207	-0.1992
RAMOS-10	0.1412	-0.0255	-0.0493	-0.0805	-0.0050	-0.1493	-0.1071	-0.0022	-0.0071	0.1108
RAMOS-11	-0.1005	0.0936	-0.1049	-0.0874	-0.0061	-0.0372	-0.2280	0.0852	-0.3785	-0.0573
RAMOS-12	-0.0247	-0.0185	0.2105	0.1191	-0.0457	-0.1823	0.2342	0.1862	0.2123	-0.1002
RAMOS-13	-0.0853	-0.1997	-0.1402	-0.0658	0.0252	-0.1681	0.0036	-0.0551	-0.1827	-0.1007
RAMOS-14	0.1454	-0.1172	0.1887	-0.1413	-0.0457	0.0486	-0.2639	0.0345	-0.0266	0.1985
RAMOS-15	-0.1099	0.3670	0.1341	-0.0415	0.0043	0.0172	0.1579	0.1496	0.1154	-0.1876
RAMOS-16	0.0054	-0.0118	-0.1645	0.0418	0.0038	-0.2445	0.0730	0.3606	-0.2580	-0.0223
RAMOS-17	-0.0265	-0.2389	-0.1046	0.2293	-0.0561	-0.1800	0.2296	0.1532	0.1072	-0.0661
RAMOS-18	0.0002	0.0134	0.0288	-0.0988	-0.0725	0.4773	-0.0598	-0.1142	0.0420	-0.0161
RAMOS-19	-0.0326	-0.0847	-0.1137	-0.1378	0.4676	-0.0154	-0.0042	-0.1622	0.0318	0.1317
RAMOS-20	0.0465	0.0678	-0.0836	-0.0531	0.0834	-0.1245	-0.1176	-0.1130	0.0908	0.0419

Grade 2 Reading (continued)

	APPLE-28	APPLE-29	APPLE-30	APPLE-31	APPLE-32	APPLE-33	APPLE-34	APPLE-35	APPLE-36	APPLE-37
APPLE--1	0.0121	-0.2339	-0.0188	0.0531	0.0459	-0.1892	0.2652	-0.1329	-0.0291	0.0220
APPLE--2	0.4485	0.0321	-0.1633	0.3082	0.2119	0.0230	0.2430	0.0113	0.1028	0.3500
APPLE--3	-0.1401	0.1591	0.0596	0.0549	-0.0608	-0.1695	0.3966	0.2882	0.2826	-0.0194
APPLE--4	-0.2625	0.2759	0.3588	-0.1199	0.1232	0.0002	-0.2215	0.0977	0.2481	-0.3113
APPLE--5	-0.1398	0.0798	-0.2208	-0.1140	0.0193	-0.1338	0.1728	0.2137	0.1051	-0.1327
APPLE--6	0.1453	0.0497	-0.1577	0.3657	-0.0889	-0.0979	0.3470	0.2883	0.0322	0.1060
APPLE--7	-0.1267	0.0894	0.4789	-0.1245	-0.0823	0.2104	-0.0142	-0.0574	0.2276	-0.1889
APPLE--8	0.0031	-0.0910	-0.1098	-0.0717	0.1380	0.4919	0.0431	0.0460	0.0427	-0.0892
APPLE--9	0.6297	-0.0089	-0.1361	-0.1916	-0.1599	-0.1175	-0.0997	0.1831	-0.1980	0.7398
APPLE-10	0.3584	-0.2397	0.2674	0.2587	-0.0278	-0.1137	0.3915	-0.1841	-0.1397	0.4993
APPLE-11	-0.1260	-0.2794	0.0590	-0.0187	0.1606	0.1027	0.2012	0.1898	-0.2740	-0.1681
APPLE-12	-0.0818	-0.0535	-0.0953	-0.0744	-0.0970	-0.0063	-0.2014	-0.1401	-0.1601	-0.0559
APPLE-13	-0.1251	0.0033	0.0921	-0.0942	-0.0303	-0.1183	-0.0924	0.0881	-0.1138	-0.1492
APPLE-14	-0.1731	-0.0607	0.0917	0.0384	0.0083	0.1759	-0.0909	-0.2442	-0.3057	-0.0700
APPLE-15	0.0286	0.2452	-0.2415	-0.0505	0.2049	-0.1979	-0.0390	0.4640	0.1828	-0.0234
APPLE-16	0.2007	0.0940	-0.1610	-0.1785	0.0406	-0.1108	-0.1387	-0.1559	0.0228	0.1791
APPLE-17	-0.0988	-0.1006	-0.1236	0.2077	-0.0424	-0.1578	0.2024	-0.1578	0.5964	-0.1204
APPLE-19	-0.0188	0.2270	0.3017	-0.1605	-0.1062	0.3669	0.1180	0.2372	0.3065	-0.0922
APPLE-20	-0.2902	-0.1698	-0.1794	-0.2261	0.1680	-0.2978	-0.2455	-0.0153	-0.0670	-0.1228
APPLE-21	-0.0950	-0.0524	0.5596	0.0489	-0.0618	0.2762	-0.1027	-0.1284	-0.1871	-0.1048
APPLE-22	0.4144	-0.0429	-0.0354	-0.1482	-0.0472	0.0048	-0.1271	-0.0609	0.0398	0.3606
APPLE-23	-0.1955	0.0948	-0.3657	-0.2090	0.3006	-0.1488	-0.0297	0.2790	0.2199	-0.2145
APPLE-24	-0.1392	0.0820	0.0049	-0.1370	-0.0519	-0.0288	0.1530	0.0662	0.1619	0.0277
APPLE-25	-0.0193	-0.1070	-0.0760	-0.0715	-0.0715	-0.0534	0.2522	-0.1168	0.0685	0.0390
APPLE-26	-0.0820	-0.0132	-0.1885	0.6916	0.0804	-0.1023	0.7122	0.0232	0.0554	-0.1223
APPLE-27	0.9114	-0.1158	-0.0651	-0.0695	-0.0688	-0.1114	-0.0852	0.1218	-0.1195	0.8701
APPLE-28	1.0000	-0.0992	-0.0788	-0.0681	-0.0347	-0.0254	-0.0928	0.0512	-0.0535	0.9033
APPLE-29	-0.0992	1.0000	0.0797	-0.0069	-0.0105	-0.0346	-0.0134	0.2416	0.1420	-0.0927
APPLE-30	-0.0788	0.0797	1.0000	0.1017	-0.1315	0.1096	-0.0387	-0.0029	0.1503	-0.0914

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Grade 2 Reading (continued)

	APPLE-28	APPLE-29	APPLE-30	APPLE-31	APPLE-32	APPLE-33	APPLE-34	APPLE-35	APPLE-36	APPLE-37
APPLE-31	-0.0681	-0.0069	0.1017	1.0000	0.0165	-0.1225	0.6776	-0.0302	-0.1029	-0.0864
APPLE-32	-0.0347	-0.0105	-0.1315	0.0165	1.0000	-0.1494	-0.0104	0.1271	-0.0490	-0.0577
APPLE-33	-0.0254	-0.0346	0.1096	-0.1225	-0.1494	1.0000	-0.0905	-0.0444	-0.0744	-0.1377
APPLE-34	-0.0928	-0.0134	-0.0387	0.6776	-0.0104	-0.0905	1.0000	0.1707	-0.0080	-0.1323
APPLE-35	0.0512	0.2416	-0.0029	-0.0302	0.1271	-0.0444	0.1707	1.0000	0.0068	0.0239
APPLE-36	-0.0535	0.1420	0.1503	-0.1029	-0.0490	-0.0744	-0.0080	0.0068	1.0000	-0.0745
APPLE-37	0.9033	-0.0927	-0.0914	-0.0864	-0.0577	-0.1377	-0.1323	0.0239	-0.0745	1.0000
APPLE-38	-0.2109	-0.0731	-0.4251	-0.2893	0.1310	-0.1331	-0.2715	0.0053	-0.0202	-0.1539
APPLE-39	-0.1648	-0.0633	0.1283	0.0045	0.0200	0.0305	0.0280	-0.1272	0.0327	-0.2152
APPLE-40	-0.1102	-0.1464	-0.1698	-0.0953	-0.0166	-0.2809	0.1791	0.0151	-0.0571	-0.0823
APPLE-41	0.3641	-0.1222	0.2134	-0.1645	-0.0799	0.0756	-0.1728	0.2758	0.0354	0.3835
APPLE-42	0.1004	-0.0241	-0.0154	-0.0733	0.0784	0.1017	-0.0465	0.2032	-0.0971	0.1321
APPLE-43	0.1519	-0.0300	-0.1711	0.6264	-0.0773	-0.1458	0.5752	0.1118	-0.1604	0.1085
APPLE-44	-0.0638	-0.1277	-0.1109	-0.0584	0.3666	-0.1535	-0.1166	-0.0032	-0.0295	-0.0531
APPLE-45	0.1411	-0.0315	0.1623	-0.1646	0.0621	-0.0113	-0.1297	-0.0741	0.0854	0.1584
APPLE-46	-0.0492	0.2692	-0.1390	0.0436	0.0031	0.0411	0.0688	0.1604	0.2426	-0.0987
APPLE-47	-0.1411	-0.0631	0.1343	-0.0795	-0.0604	-0.0532	-0.1057	0.0314	0.0252	-0.2079
APPLE-48	-0.1310	-0.1585	-0.0040	0.7130	-0.0506	0.0186	0.5039	-0.1216	0.1686	-0.1711
APPLE-49	-0.0852	0.0119	-0.0442	0.4175	0.2205	-0.1137	0.1974	0.0820	-0.0351	-0.0339
APPLE-50	0.0927	0.2178	-0.2445	0.3463	-0.0062	-0.0545	0.3055	0.1069	-0.0360	0.0750
CATRC-GN	0.0041	0.1017	0.0724	-0.3338	0.0105	-0.1189	-0.4398	0.1335	0.0624	-0.0242
RAPPL-GN	-0.1579	0.0938	-0.0449	-0.0166	-0.1070	-0.0796	-0.1635	-0.1641	-0.0357	-0.1215
DECOD-GN	0.1508	-0.0021	-0.0056	0.0106	0.1214	-0.1995	-0.0623	-0.0836	0.2031	0.1802
RACH.-GN	-0.1664	0.4163	0.1724	-0.0377	-0.0018	0.0864	-0.1539	0.0062	0.1051	-0.1214
TOTRC-GN	-0.1656	0.2191	0.0531	-0.1624	-0.0468	-0.0894	-0.2993	0.0419	0.0367	-0.1358

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Grade 2 Reading (continued)

	APPLE-38	APPLE-39	APPLE-40	APPLE-41	APPLE-42	APPLE-43	APPLE-44	APPLE-45	APPLE-46	APPLE-47
WD-----1	-0.1406	0.1120	-0.0264	0.2053	0.3108	-0.2569	-0.0987	0.0632	-0.0368	0.0549
WD-----2	-0.0234	0.0974	0.0056	0.0750	0.0271	0.2404	-0.1035	-0.0889	0.1251	0.0288
WD-----3	-0.0692	-0.1170	0.2757	0.0538	0.0975	0.1553	0.0761	-0.1490	-0.3078	0.0244
WD-----4	-0.0409	0.2597	-0.0116	0.0381	0.0703	-0.0918	0.3184	0.0633	0.1819	-0.1726
WD-----5	-0.3719	-0.0594	0.1053	-0.0632	0.0633	0.0844	0.2393	-0.2607	-0.2495	0.1157
WD-----6	-0.2771	0.1609	0.1755	-0.0451	0.2800	-0.1334	0.1286	-0.3649	-0.3230	0.1869
WD-----7	-0.0417	-0.2390	-0.0555	0.1810	-0.1270	-0.1388	-0.1466	0.2824	-0.1682	0.0169
WD-----8	-0.0495	-0.1358	0.0559	0.2981	-0.0913	-0.2050	-0.1627	0.2246	-0.4502	0.0192
WD-----9	0.3914	0.2084	0.3422	-0.0771	0.0950	0.0152	0.1945	-0.3448	0.1456	-0.0123
WD----10	0.1283	0.0960	0.3290	-0.0217	0.0992	-0.0098	0.0940	-0.3222	0.1260	0.0522
WD----11	0.2354	0.0213	0.2223	0.0434	0.2304	-0.0404	0.1788	-0.3054	0.1166	-0.0368
WD----12	0.1164	-0.0230	0.1618	-0.0224	0.1047	-0.0333	-0.0236	-0.2669	0.1974	0.0306
WD----13	0.0035	0.0305	-0.1228	0.0434	0.2247	-0.0374	-0.1422	-0.0639	0.3118	-0.1109
WD----14	-0.0007	-0.0701	0.1524	0.0916	0.3976	0.1863	-0.0696	-0.1231	-0.0014	-0.0698
WD----15	0.0076	-0.3153	0.0947	0.0787	0.0456	0.1477	-0.1830	0.1550	-0.0207	-0.0191
WD----16	-0.1004	-0.2655	0.1250	0.2652	0.1676	-0.0971	-0.1831	0.0488	0.0862	0.1316
WD----17	-0.1428	-0.2888	0.1069	0.2987	-0.1295	-0.1025	-0.2604	0.1139	-0.3406	-0.0909
WD----18	-0.3593	-0.0386	0.1647	0.3223	-0.2508	-0.1245	-0.2062	-0.0624	-0.3763	0.0447
WD----19	-0.1352	-0.1813	0.0991	0.3698	-0.1399	-0.1256	-0.2611	0.3925	-0.3822	0.0697
WD----20	-0.1472	-0.3097	-0.0575	0.1545	-0.0798	-0.0364	-0.1646	0.0810	-0.3610	0.0341
WD----21	0.1129	-0.0997	0.1732	-0.2553	0.1610	-0.0387	0.1626	-0.2729	-0.0822	0.0561
WD----22	0.0646	0.0437	0.1209	-0.1553	-0.1522	-0.1856	0.0937	-0.1769	-0.1891	0.2163
WD----23	-0.0093	-0.1171	0.3156	0.2397	0.1356	0.1732	-0.0411	-0.0027	-0.1062	0.0705
WD----24	0.1006	0.1264	-0.0891	-0.1826	-0.1450	0.2332	0.2408	-0.2327	0.2882	-0.2785
WD----25	0.0644	-0.2327	0.0595	0.0293	0.1063	0.1778	-0.1395	0.1655	-0.0006	-0.0803
WD----26	-0.1953	-0.0302	-0.2315	-0.0427	0.1890	-0.1001	-0.1395	0.2396	-0.0503	-0.0899
WD----27	-0.1172	0.1666	0.0403	0.0091	-0.0796	-0.0169	-0.1043	-0.1429	0.0104	0.3169
WD----28	-0.2682	-0.1119	0.0423	0.0820	-0.1837	-0.1862	-0.0151	0.0895	-0.4448	0.0761
WD----29	0.0230	-0.3579	-0.0431	0.2030	-0.2841	-0.0629	-0.2010	0.5079	-0.3318	0.0009
WD----30	0.1430	-0.1871	0.2272	0.0876	-0.0177	-0.0888	-0.1445	0.2164	-0.3329	0.0254
WD----31	-0.2294	-0.0046	0.1595	0.3176	-0.1484	-0.1826	-0.2373	0.2961	-0.4081	0.1555
WD----32	0.3383	0.1526	0.3205	0.0846	-0.0111	0.1035	0.2442	-0.1160	0.3095	0.1979
WD----33	-0.0298	-0.1265	-0.2623	-0.1846	-0.2621	-0.1168	-0.1801	0.3146	-0.3275	-0.3074
WD----34	-0.2027	0.2294	0.3312	-0.0410	0.0551	-0.1652	0.0467	-0.4539	-0.2872	0.1232

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Grade 2 Reading (continued)

	APPLE-38	APPLE-39	APPLE-40	APPLE-41	APPLE-42	APPLE-43	APPLE-44	APPLE-45	APPLE-46	APPLE-47
RAMOS--1	-0.1609	0.2240	0.0217	0.0651	-0.1836	-0.1040	0.0217	0.0834	-0.0592	-0.0649
RAMOS--2	-0.1837	0.0158	-0.1675	-0.0455	-0.2062	-0.0916	0.0321	0.0344	0.0149	0.0568
RAMOS--3	0.0881	0.4184	0.0495	0.2251	0.1383	-0.0156	0.0479	-0.0803	-0.0770	-0.0586
RAMOS--4	-0.1538	-0.1080	0.3957	-0.1744	-0.1760	-0.0024	-0.0845	0.2267	-0.0468	-0.2115
RAMOS--5	-0.0088	-0.0954	0.3116	0.0692	-0.1433	-0.0305	-0.0947	0.2360	-0.0829	-0.1787
RAMOS--6	-0.1419	-0.2055	0.1008	0.0905	-0.0214	-0.1812	-0.1215	0.1348	0.2278	-0.0331
RAMOS--7	0.0699	-0.0602	-0.0475	-0.1816	-0.1162	0.3519	0.2154	-0.0586	-0.1119	-0.1480
RAMOS--8	-0.0125	0.1995	0.0838	0.3128	-0.0931	-0.1252	-0.1379	-0.0523	0.0732	0.0243
RAMOS--9	-0.0355	0.1583	0.0453	0.0564	-0.2817	0.1126	0.0355	0.0441	0.2523	-0.1560
RAMOS-10	0.1752	-0.1430	0.0841	0.1235	0.1917	-0.1156	-0.1328	-0.1689	0.3900	0.3433
RAMOS-11	0.1699	0.2799	0.0940	0.0624	0.0195	0.0370	0.1420	-0.2532	0.2863	0.1400
RAMOS-12	-0.1369	-0.1022	-0.0905	0.0940	-0.1806	-0.0272	0.0884	0.1302	0.2347	-0.0844
RAMOS-13	0.0492	0.1107	0.0693	-0.2408	0.2509	0.2600	-0.0177	-0.3321	-0.1238	-0.1580
RAMOS-14	0.0429	0.0182	-0.2372	0.0092	-0.0139	-0.0452	-0.0428	0.0149	0.2161	-0.0984
RAMOS-15	-0.2040	0.0443	0.0699	-0.0115	-0.2651	0.0486	-0.2453	0.1849	-0.0616	-0.1567
RAMOS-16	0.2166	-0.0285	0.1502	0.0187	-0.1315	0.1474	0.5025	-0.1351	0.1058	0.1991
RAMOS-17	-0.0180	0.1300	-0.0040	0.0288	0.1879	0.2139	-0.0105	-0.0538	0.2233	-0.2273
RAMOS-18	-0.0816	-0.0283	-0.1182	0.0210	-0.0174	-0.1578	-0.0029	-0.1292	0.2686	0.0364
RAMOS-19	0.1209	-0.2331	-0.1711	0.0083	0.0880	-0.1038	0.1726	0.1937	-0.1758	-0.0927
RAMOS-20	0.1452	-0.1366	0.3555	0.2641	0.2624	-0.1148	0.0218	-0.3330	0.2676	0.3159

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Grade 2 Reading (continued)

	APPLE-38	APPLE-39	APPLE-40	APPLE-41	APPLE-42	APPLE-43	APPLE-44	APPLE-45	APPLE-46	APPLE-47
APPLE--1	-0.0088	0.1775	0.2268	-0.0817	-0.0615	0.1299	0.0469	-0.0041	0.2736	-0.0079
APPLE--2	-0.1579	-0.0904	-0.0744	-0.0407	0.2384	0.2659	0.0161	0.0637	-0.0201	-0.2400
APPLE--3	-0.0451	-0.1327	0.2867	0.0323	-0.0753	0.0353	-0.1423	0.0076	0.2603	-0.0962
APPLE--4	0.0670	0.0728	-0.0550	-0.0630	-0.2513	-0.1943	-0.1273	0.4065	0.0134	0.1149
APPLE--5	0.2369	0.0030	0.0741	-0.2278	-0.0150	-0.1520	-0.1921	0.0277	0.3831	0.1329
APPLE--6	-0.2505	-0.1908	-0.0498	0.0945	0.2161	0.5349	-0.1543	-0.1456	0.3101	0.0081
APPLE--7	-0.0346	0.1283	-0.1242	0.0927	-0.2649	-0.2711	-0.0347	0.1404	0.2527	0.1499
APPLE--8	-0.0093	-0.0314	0.0564	-0.0462	0.2909	-0.0083	0.2716	-0.0626	-0.1165	-0.1745
APPLE--9	0.0384	-0.2936	0.0245	0.4530	0.1544	0.0918	-0.0914	0.2676	-0.2082	-0.2378
APPLE-10	-0.3507	0.0297	0.1980	0.1226	0.0349	0.2106	0.0302	0.2073	-0.3073	-0.2516
APPLE-11	0.0959	0.0553	0.1766	0.0034	0.4322	0.2086	-0.0311	0.0378	-0.2439	-0.0085
APPLE-12	-0.1243	0.3592	0.1544	0.2487	-0.1275	-0.1441	-0.0650	-0.0113	-0.1647	0.2174
APPLE-13	-0.1744	-0.0468	-0.1661	-0.1724	-0.1767	-0.1048	0.0907	0.3454	-0.1504	0.0919
APPLE-14	-0.1227	0.2867	0.0046	0.1755	-0.2103	-0.1852	0.1476	0.0379	-0.1787	0.1845
APPLE-15	0.2805	0.0028	-0.0736	-0.1674	0.2324	0.1221	0.0497	-0.0347	0.0797	0.1829
APPLE-16	0.2873	0.1440	0.1407	0.1566	-0.0039	-0.1745	0.3472	-0.1601	0.3052	0.0087
APPLE-17	0.1297	-0.0555	-0.1474	-0.2514	-0.0911	0.1817	-0.1123	0.1207	-0.0046	0.1268
APPLE-19	-0.3826	-0.1329	0.1062	0.1310	0.0044	-0.1496	-0.1496	0.0996	0.0404	-0.1076
APPLE-20	0.4120	0.0433	0.0438	0.0681	-0.1185	-0.1581	0.1490	0.2930	-0.1065	0.1890
APPLE-21	-0.2122	0.2672	-0.1706	-0.0462	0.2335	-0.2197	-0.0998	0.0759	-0.0990	0.0328
APPLE-22	0.0988	-0.2493	0.4364	0.4396	0.2336	-0.1069	0.1940	-0.1700	-0.0386	0.2619
APPLE-23	0.3822	0.2443	0.0136	-0.1792	-0.0173	0.0076	0.0927	0.0038	0.4354	0.1519
APPLE-24	0.0360	-0.2657	0.1901	0.0466	-0.0385	0.0006	0.0325	0.2002	0.0947	-0.1990
APPLE-25	-0.0910	-0.0371	0.5251	-0.1883	0.0059	-0.0064	-0.0686	0.1064	-0.0132	-0.1593
APPLE-26	-0.1407	-0.0452	-0.0202	-0.2787	0.1171	0.6741	0.0558	-0.1898	0.2459	-0.1903
APPLE-27	-0.1641	-0.1192	-0.0748	0.3372	0.0677	0.1743	-0.0277	0.1369	-0.0697	-0.1508
APPLE-28	-0.2109	-0.1648	-0.1102	0.3641	0.1004	0.1519	-0.0638	0.1411	-0.0492	-0.1411
APPLE-29	-0.0731	-0.0633	-0.1464	-0.1222	-0.0241	-0.0300	-0.1277	-0.0315	0.2692	-0.0631
APPLE-30	-0.4251	0.1283	-0.1698	0.2134	-0.0154	-0.1711	-0.1109	0.1623	-0.1390	0.1343

Grade 2 Reading (continued)

	APPLE-38	APPLE-39	APPLE-40	APPLE-41	APPLE-42	APPLE-43	APPLE-44	APPLE-45	APPLE-46	APPLE-47
APPLE-31	-0.2893	0.0045	-0.0953	-0.1645	-0.0733	0.6264	-0.0584	-0.1646	0.0436	-0.0795
APPLE-32	0.1310	0.0200	-0.0166	-0.0799	0.0784	-0.0773	0.3666	0.0621	0.0031	-0.0604
APPLE-33	-0.1331	0.0305	-0.2809	0.0756	0.1017	-0.1458	-0.1535	-0.0113	0.0411	-0.0532
APPLE-34	-0.2715	0.0280	0.1791	-0.1728	-0.0465	0.5752	-0.1166	-0.1297	0.0688	-0.1057
APPLE-35	0.0053	-0.1272	0.0151	0.2758	0.2032	0.1118	-0.0032	-0.0741	0.1604	0.0314
APPLE-36	-0.0202	0.0327	-0.0571	0.0354	-0.0971	-0.1604	-0.0295	0.0854	0.2426	0.0252
APPLE-37	-0.1539	-0.2152	-0.0823	0.3835	0.1321	0.1085	-0.0531	0.1584	-0.0987	-0.2079
APPLE-38	1.0000	-0.0195	0.1177	-0.0660	-0.0477	-0.1144	0.2584	0.1468	0.1943	0.0019
APPLE-39	-0.0195	1.0000	0.1462	0.0070	-0.1153	-0.0153	0.1436	-0.1763	0.1731	0.0209
APPLE-40	0.1177	0.1462	1.0000	0.1956	0.1488	-0.0327	0.1244	-0.2125	-0.2232	0.3021
APPLE-41	-0.0660	0.0070	0.1956	1.0000	0.1784	-0.0637	-0.1250	-0.0579	-0.0244	0.2097
APPLE-42	-0.0477	-0.1153	0.1488	0.1784	1.0000	0.0917	-0.0395	-0.1745	-0.1290	-0.0313
APPLE-43	-0.1144	-0.0153	-0.0327	-0.0637	0.0917	1.0000	-0.0409	-0.1458	0.1214	-0.2766
APPLE-44	0.2584	0.1436	0.1244	-0.1250	-0.0395	-0.0409	1.0000	-0.0205	-0.0058	-0.2192
APPLE-45	0.1468	-0.1763	-0.2125	-0.0579	-0.1745	-0.1458	-0.0205	1.0000	-0.2347	-0.2028
APPLE-46	0.1943	0.1731	-0.2232	-0.0244	-0.1290	0.1214	-0.0058	-0.2347	1.0000	-0.0043
APPLE-47	0.0019	0.0209	0.3021	0.2097	-0.0313	-0.2766	-0.2192	-0.2028	-0.0043	1.0000
APPLE-48	-0.0487	0.1966	0.0152	-0.1831	-0.0182	0.4436	0.0640	-0.2744	0.0364	0.1524
APPLE-49	-0.0967	-0.3180	-0.3094	-0.1404	-0.0128	0.2552	-0.0640	0.0092	0.1203	0.0226
APPLE-50	-0.0451	-0.1732	0.2271	0.1668	0.2544	0.4084	0.0691	-0.3531	0.0640	0.1182
CATRC-GN	0.1883	0.1037	0.0139	-0.0754	-0.0656	-0.3777	0.1718	-0.0147	0.1928	0.2249
RAPPL-GN	0.1740	-0.0307	-0.0944	0.0062	-0.1126	-0.0674	0.2613	-0.1013	0.4137	-0.0075
DECOD-GN	0.1483	-0.1082	0.0274	0.1260	-0.0180	-0.0145	0.1550	0.0626	0.3550	0.2690
RACH.-GN	-0.1123	0.0210	-0.2770	-0.1320	0.1676	-0.0324	0.0207	0.0087	0.1595	-0.0392
TOTRD-GN	0.1601	0.0068	-0.1219	-0.0304	-0.0066	-0.1956	0.2830	-0.1777	0.4327	0.1142

Grade 2 Reading (continued)

	APPLE-48	APPLE-49	APPLE-50	CATRC-GN	RAPPL-GN	DECOD-GN	RACH.-GN	TOTRD-GN
WD-----1	-0.1782	-0.0619	-0.2068	0.0354	0.0393	-0.0583	0.1057	0.1901
WD-----2	0.2373	0.2499	-0.0464	-0.1104	-0.2622	0.0305	-0.1338	-0.2622
WD-----3	-0.0062	0.0103	0.3895	-0.0070	0.2936	0.1831	0.0771	0.2215
WD-----4	-0.1587	-0.2767	-0.2352	-0.0040	-0.0853	0.2177	0.0389	-0.0731
WD-----5	0.0991	0.0213	-0.0092	-0.1312	-0.0551	0.1167	-0.1295	-0.1250
WD-----6	0.1230	-0.1454	0.0038	0.0261	-0.0015	-0.1352	0.0320	0.0646
WD-----7	-0.1903	-0.0367	-0.1425	-0.1683	-0.0278	0.0073	-0.0697	-0.0646
WD-----8	-0.1911	-0.2118	0.0668	-0.1844	-0.0472	0.0017	-0.0470	-0.1974
WD-----9	0.0814	-0.3565	-0.0150	0.1249	0.1814	0.1693	0.2700	0.2511
WD----10	0.0639	-0.1571	0.1868	0.0501	0.1314	0.0609	0.1876	0.1850
WD----11	0.2456	-0.2097	0.0213	0.2056	0.2568	0.1801	0.0975	0.2145
WD----12	0.0791	-0.1539	0.0571	0.3615	0.0326	0.1509	0.3172	0.2510
WD----13	-0.1850	0.0339	0.2039	-0.1036	0.1579	-0.1645	-0.0353	0.0625
WD----14	-0.1346	-0.0886	0.1808	-0.1208	0.1774	-0.1918	0.0043	0.1389
WD----15	-0.3255	-0.0638	0.2365	-0.2418	0.0793	-0.1565	0.0614	0.0654
WD----16	-0.2707	0.0912	0.3369	-0.0831	-0.1792	-0.1164	-0.1000	-0.1279
WD----17	-0.3290	-0.0936	0.0511	-0.1468	-0.0593	-0.1629	-0.2039	-0.2319
WD----18	-0.0881	-0.1867	0.0041	-0.3519	-0.0076	-0.1726	-0.1608	-0.1742
WD----19	-0.2036	-0.1573	0.0178	-0.0970	-0.0761	-0.0686	-0.1766	-0.2293
WD----20	-0.0200	-0.1304	0.0421	-0.0218	-0.0188	-0.0662	0.0045	-0.0783
WD----21	0.2898	-0.0120	0.2069	-0.0240	0.0829	0.0623	-0.0936	0.0795
WD----22	0.2133	-0.0383	0.0660	0.0209	0.0858	0.0683	-0.0232	0.0734
WD----23	-0.1321	-0.2200	0.2086	-0.1215	-0.1659	0.2715	0.1843	-0.0329
WD----24	-0.0968	0.2386	0.2275	-0.2506	0.3075	-0.1793	-0.0868	0.1083
WD----25	-0.2280	-0.0860	0.1027	-0.0437	-0.2611	-0.0958	-0.1309	-0.1537
WD----26	-0.0197	-0.1686	-0.2482	0.3470	-0.1540	0.1983	0.3452	0.1117
WD----27	0.0699	-0.1372	-0.0464	0.1390	-0.1403	-0.1486	-0.0037	-0.0145
WD----28	-0.0296	-0.2732	0.0001	-0.0546	-0.2061	-0.0097	0.0814	-0.1943
WD----29	-0.1558	-0.0710	-0.0452	-0.2101	0.0266	0.1221	-0.1209	-0.1936
WD----30	-0.1277	-0.2187	0.1383	0.0307	-0.0966	0.2387	0.2012	-0.1522
WD----31	-0.1360	0.0031	0.0200	-0.0286	-0.2980	0.0182	-0.1005	-0.3701
WD----32	-0.0527	0.2449	0.3446	0.1168	0.1933	0.1302	-0.1245	0.2072
WD----33	-0.1077	-0.1383	-0.2211	-0.1707	-0.2064	-0.2342	0.1335	-0.3975
WD----34	0.1261	-0.1182	0.2721	0.0895	-0.1589	-0.2507	0.1445	-0.0141

Grade 2 Reading (continued)

	APPLE-48	APPLE-49	APPLE-50	CATRC-GN	RAPPL-GN	DECOD-GN	RACH.-GN	TOTRD-GN
RAMOS--1	-0.1635	-0.1935	-0.2308	-0.2723	-0.0267	-0.2017	0.0201	-0.1232
RAMOS--2	-0.0428	-0.0813	-0.1835	-0.2323	0.1477	-0.0647	0.1401	-0.0079
RAMOS--3	-0.0387	-0.1115	-0.0417	-0.0082	-0.1843	-0.1369	-0.0584	-0.0820
RAMOS--4	-0.2098	-0.1677	-0.1015	-0.1594	-0.1407	-0.0918	-0.0471	-0.1175
RAMOS--5	-0.2576	-0.0464	-0.0292	-0.0360	-0.1159	-0.1823	-0.3505	-0.2029
RAMOS--6	-0.1755	0.0573	-0.1071	-0.0900	0.0996	0.2621	0.0466	0.0069
RAMOS--7	0.0612	0.2022	0.1462	-0.3556	0.0757	-0.0238	0.1962	-0.0051
RAMOS--8	-0.1202	-0.2702	-0.0951	-0.1344	-0.1620	-0.3014	-0.3681	-0.2775
RAMOS--9	-0.1140	-0.0456	-0.0602	-0.3468	-0.0178	-0.1220	-0.1192	-0.2008
RAMOS-10	-0.0668	0.0086	0.2068	0.2066	0.3006	0.5309	0.1131	0.2972
RAMOS-11	-0.1748	-0.0336	-0.0263	0.2274	0.2319	0.0705	0.0697	0.2650
RAMOS-12	0.0018	0.2339	0.0246	0.0101	0.1718	0.1928	-0.0698	0.0741
RAMOS-13	-0.0852	-0.1302	-0.1453	-0.1317	-0.1798	-0.2789	-0.0764	-0.1928
RAMOS-14	-0.1840	-0.0441	-0.0791	0.2057	0.3039	0.4058	0.3570	0.3828
RAMOS-15	-0.3125	-0.1071	-0.1619	-0.4154	-0.1222	-0.2891	-0.0338	-0.2989
RAMOS-16	0.0741	0.0673	0.1516	0.2111	0.1435	0.0284	-0.1475	0.1989
RAMOS-17	0.1817	0.0718	0.0600	-0.1677	-0.0136	0.0174	-0.1102	-0.0723
RAMOS-18	-0.0340	-0.0793	0.0179	-0.0952	0.2285	0.1500	0.0484	0.0771
RAMOS-19	-0.1357	0.2133	0.0338	-0.2175	-0.1791	0.1312	0.0314	-0.1643
RAMOS-20	0.0439	-0.0655	0.4257	0.2249	0.3076	0.5703	0.1779	0.2939

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Grade 2 Reading (continued)

	APPLE-48	APPLE-49	APPLE-50	CATRC-GN	RAPPL-GN	DECOD-GN	RACH.-GN	TOTRD-GN
APPLE--1	-0.0248	0.1326	0.0882	-0.0042	0.2628	0.0658	-0.2109	0.1275
APPLE--2	0.3113	0.0237	0.1754	-0.1738	-0.1539	0.0337	-0.0703	-0.1707
APPLE--3	-0.0748	0.1924	-0.0385	-0.0967	0.0238	-0.0062	-0.0628	0.0062
APPLE--4	-0.2347	-0.0557	-0.3225	0.2040	-0.0605	-0.0029	0.0623	-0.0159
APPLE--5	-0.1262	0.0699	-0.0744	0.0197	0.0428	-0.1462	-0.2311	-0.0234
APPLE--6	0.1903	0.3862	0.4885	-0.0941	0.0543	0.1391	0.0724	0.0430
APPLE--7	-0.0986	0.0313	-0.3274	0.0200	0.0757	0.2292	0.0436	0.0118
APPLE--8	0.0640	-0.0079	0.2874	-0.1310	0.0370	-0.1633	-0.0897	-0.0685
APPLE--9	-0.3742	-0.0670	0.2157	0.0014	0.0037	0.0402	-0.0618	-0.0364
APPLE-10	0.0308	-0.0264	0.0315	-0.2543	-0.2553	-0.0497	-0.2342	-0.3421
APPLE-11	-0.0449	-0.0894	-0.0633	-0.2208	-0.1898	-0.1870	-0.1192	-0.2316
APPLE-12	0.0082	-0.0720	-0.0914	-0.1037	-0.1420	-0.2412	-0.2055	-0.2056
APPLE-13	-0.2174	0.2245	-0.0396	0.2616	0.2251	0.1049	0.4219	0.2831
APPLE-14	0.0619	0.0142	-0.0362	-0.1483	-0.0624	-0.0979	-0.0372	-0.0780
APPLE-15	0.2267	0.0887	0.1544	0.1288	-0.1339	0.0019	0.0790	0.1114
APPLE-16	-0.0629	-0.2295	0.2352	0.1105	0.5155	0.4884	0.1066	0.4176
APPLE-17	0.5538	-0.0005	-0.1046	-0.0987	-0.1136	0.1854	-0.0097	-0.1077
APPLE-19	-0.2443	0.0802	0.0742	-0.1688	-0.0725	-0.0894	0.0067	-0.0837
APPLE-20	-0.2386	0.1826	-0.1343	0.1013	0.0370	0.0393	-0.1601	-0.0504
APPLE-21	0.1062	-0.2130	-0.3033	0.2778	-0.0597	-0.1006	0.1198	0.1573
APPLE-22	-0.0462	-0.1215	0.4270	0.0542	0.1113	0.4644	0.0712	0.1091
APPLE-23	-0.0177	-0.0052	-0.1012	0.2063	0.0933	-0.0143	-0.0185	0.2182
APPLE-24	-0.2644	0.1102	-0.0671	-0.1953	0.1080	0.1165	0.1330	0.0883
APPLE-25	-0.1350	-0.1401	-0.1247	-0.0723	-0.0974	-0.0480	-0.1863	-0.1756
APPLE-26	0.6586	0.3751	0.4167	-0.2769	0.0821	0.1825	0.0614	-0.0305
APPLE-27	-0.1450	-0.1609	0.0055	-0.0526	-0.0116	0.1348	-0.0988	-0.0219
APPLE-28	-0.1310	-0.0852	0.0927	0.0041	-0.1579	0.1508	-0.1664	-0.1656
APPLE-29	-0.1585	0.0119	0.2178	0.1017	0.0938	-0.0021	0.4163	0.2191
APPLE-30	-0.0040	-0.0442	-0.2445	0.0724	-0.0449	-0.0056	0.1724	0.0531

Grade 2 Reading (continued)

	APPLE-48	APPLE-49	APPLE-5C	CATRC-GN	RAPPL-GN	DECOD-GN	RACH.-GN	TOTRD-GN
APPLE-31	0.7130	0.4175	0.3463	-0.3338	-0.0166	0.0106	-0.0377	-0.1624
APPLE-32	-0.0506	0.2205	-0.0062	0.0105	-0.1070	0.1214	-0.0018	-0.0468
APPLE-33	0.0186	-0.1137	-0.0545	-0.1189	-0.0796	-0.1995	0.0864	-0.0894
APPLE-34	0.5039	0.1974	0.3055	-0.4398	-0.1635	-0.0623	-0.1539	-0.2993
APPLE-35	-0.1216	0.0820	0.1069	0.1335	-0.1641	-0.0836	0.0062	0.0419
APPLE-3[illegible]	0.1686	-0.0351	-0.0360	0.0624	-0.0357	0.2031	0.1051	0.0367
APPLE-37	-0.1711	-0.0339	0.0750	-0.0242	-0.1215	0.1802	-0.1214	-0.1358
APPLE-38	-0.0487	-0.0967	-0.0451	0.1883	0.1740	0.1483	-0.1123	0.1601
APPLE-39	0.1966	-0.3180	-0.1732	0.1037	-0.0307	-0.1082	0.0210	0.0068
APPLE-40	0.0152	-0.3094	0.2271	0.0139	-0.0944	0.0274	-0.2770	-0.1219
APPLE-41	-0.1831	-0.1404	0.1668	-0.0754	0.0062	0.1260	-0.1320	-0.0304
APPLE-42	-0.0182	-0.0128	0.2544	-0.0656	-0.1126	-0.0180	0.1676	-0.0066
APPLE-43	0.4436	0.2552	0.4084	-0.3777	-0.0674	-0.0145	-0.0324	-0.1956
APPLE-44	0.0640	-0.0640	0.0691	0.1718	0.2613	0.1550	0.0207	0.2830
APPLE-45	-0.2744	0.0092	-0.3531	-0.0147	-0.1013	0.0626	0.0087	-0.1777
APPLE-46	0.0364	0.1203	0.0640	0.1928	0.4137	0.3550	0.1595	0.4327
APPLE-47	0.1524	0.0226	0.1182	0.2249	-0.0075	0.2690	-0.0392	0.1142
APPLE-48	1.0000	0.2160	0.2758	-0.1626	-0.0609	0.1243	-0.0292	-0.0917
APPLE-49	0.2160	1.0000	0.4100	-0.1305	0.0878	0.0554	0.0354	0.0452
APPLE-50	0.2758	0.4100	1.0000	-0.1518	0.1868	0.1508	0.0663	0.1299
CATRC-GN	-0.1626	-0.1305	-0.1518	1.0000	0.0965	0.1928	0.1516	0.4781
RAPPL-GN	-0.0609	0.0878	0.1868	0.0965	1.0000	0.4431	0.4352	0.8363
DECOD-GN	0.1243	0.0554	0.1508	0.1928	0.4431	1.0000	0.4672	0.4339
RACH.-GN	-0.0292	0.0354	0.0663	0.1516	0.4352	0.4672	1.0000	0.6372
TOTRC-GN	-0.0917	0.0452	0.1299	0.4781	0.8363	0.4339	0.6372	1.0000

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Correlations Among the Basic Components of the Teaching Performance Variables and the Pupil Achievement Tests
Grade 5 Reading

(N = 53)

BTES GRADE 5 READING

	WD-----1	WD-----2	WD-----3	WD-----4	WD-----5	WD-----6	WD-----7	WD-----8	WD-----9	WD----10
WD-----1	1.0000	0.1422	0.4096	0.4341	0.1314	0.2209	0.5000	0.3748	0.3985	0.3495
WD-----2	0.1422	1.0000	0.2166	0.2416	0.3959	0.4523	0.0017	0.0679	0.0775	-0.1058
WD-----3	0.4096	0.2166	1.0000	0.5225	0.2683	0.2822	0.1992	0.2224	0.2958	0.0749
WD-----4	0.4341	0.2416	0.5225	1.0000	0.3686	0.3080	0.2304	0.1870	0.2263	0.2154
WD-----5	0.1314	0.3959	0.2683	0.3686	1.0000	0.4060	0.1311	0.2619	-0.0185	-0.1525
WD-----6	0.2209	0.4523	0.2822	0.3080	0.4060	1.0000	0.2713	0.4560	0.0631	0.0621
WD-----7	0.5000	0.0017	0.1992	0.2304	0.1311	0.2713	1.0000	0.7366	0.0919	0.1230
WD-----8	0.3748	0.0679	0.2224	0.1870	0.2619	0.4560	0.7366	1.0000	-0.0503	0.1210
WD-----9	0.3985	0.0775	0.2958	0.2263	-0.0185	0.0631	0.0919	-0.0503	1.0000	0.5230
WD----10	0.3495	-0.1058	0.0749	0.2154	-0.1525	0.0621	0.1230	0.1210	0.5230	1.0000
WD----11	0.3281	-0.1560	0.1217	-0.0187	0.1097	0.0442	0.0919	-0.0117	0.6734	0.4230
WD----12	0.2968	-0.1058	0.1458	0.0767	-0.1302	0.0995	0.1111	-0.0031	0.7232	0.4667
WD----13	-0.1360	-0.1943	-0.3594	-0.1684	-0.1680	-0.2858	-0.0624	-0.1854	-0.1214	-0.1694
WD----14	-0.2670	-0.0610	-0.3273	-0.2615	-0.0078	-0.3275	-0.2318	-0.3057	-0.2739	-0.2756
WD----15	-0.2440	-0.1460	-0.2060	-0.0534	-0.1611	-0.2636	-0.1160	-0.1764	-0.1069	-0.1613
WD----16	-0.3253	-0.1887	-0.1864	-0.1333	-0.3069	-0.2272	-0.1721	-0.2137	-0.1906	-0.4047
WD----17	0.2512	0.2939	0.0849	0.0858	0.2600	0.3854	0.5782	0.6104	0.0358	0.0738
WD----18	0.1447	0.2497	0.0995	0.1791	0.2926	0.4047	0.4553	0.5583	-0.0304	0.0617
WD----19	0.3128	0.1343	0.1455	0.0745	0.1542	0.2765	0.6253	0.6687	-0.0439	0.0988
WD----20	0.2517	0.2336	0.0526	0.0156	0.1418	0.2285	0.4976	0.6858	-0.0811	-0.0056
WD----21	0.0374	0.0951	0.0089	-0.0597	-0.2474	0.1557	0.0379	-0.0761	0.4271	0.2374
WD----22	0.1876	0.1567	0.1088	0.0612	-0.2093	0.0772	0.0274	-0.0243	0.5341	0.2671
WD----23	-0.1928	-0.2766	-0.2764	-0.1944	-0.3722	-0.3138	-0.0987	-0.1397	-0.2252	0.0032
WD----24	-0.0317	0.2438	-0.0009	0.0134	0.1172	0.1560	-0.3351	-0.3243	0.0496	-0.0805
WD----25	0.1871	0.0476	0.2976	0.2562	0.1506	0.1570	0.0432	0.2132	0.0716	0.0261
WD----26	0.1261	-0.1506	-0.0594	0.1833	-0.0986	-0.2671	0.1691	-0.0028	0.1040	0.0251
WD----27	-0.2028	-0.0389	-0.0877	-0.1839	-0.1816	0.0527	0.0288	0.0272	0.0303	-0.0448
WD----28	0.2091	0.3026	-0.0254	0.0329	0.1854	0.3289	0.5592	0.6635	-0.1785	-0.0372
WD----29	0.2114	0.3271	-0.0023	0.0152	0.2183	0.3225	0.5841	0.6537	-0.2172	-0.1116
WD----30	0.1848	0.1157	0.1074	0.0459	0.1663	0.1761	0.4252	0.5475	0.0073	0.1271
WD----31	0.2051	0.1496	0.0227	0.0686	0.0434	0.0248	0.3503	0.5563	-0.1754	0.0014
WD----32	0.1284	-0.1678	-0.1217	0.0446	0.0450	-0.1760	-0.0012	-0.0510	0.1456	0.0632
WD----33	-0.1080	-0.0868	-0.0518	-0.1137	-0.0782	0.0072	-0.0068	0.0441	-0.2860	-0.1245
WD----34	-0.1227	0.1589	0.1256	0.0258	0.0628	0.0836	0.1642	0.1564	0.0352	0.1135

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Grade 5 Reading (continued)

	WD-----1	WD-----2	WD-----3	WD-----4	WD-----5	WD-----6	WD-----7	WD-----8	WD-----9	WD----10
RAMOS--1	0.0619	-0.0380	0.3392	0.1731	-0.2240	-0.0821	-0.0532	-0.0026	0.1428	0.2457
RAMOS--2	0.2135	0.1790	0.3232	0.3512	0.0256	0.2069	0.0362	0.2357	0.2097	0.2528
RAMOS--3	-0.1284	-0.2549	-0.0938	-0.1320	-0.3145	-0.2940	-0.0849	-0.1740	-0.0815	0.0927
RAMOS--4	-0.1401	0.0595	0.3420	-0.0411	0.1018	-0.0233	-0.1153	-0.1412	0.0125	-0.0813
RAMOS--5	0.1507	0.0209	0.1613	-0.0231	-0.1083	-0.0563	0.1147	-0.0647	0.1320	-0.1190
RAMOS--6	-0.1049	-0.0786	-0.0859	-0.2617	0.0251	0.0025	-0.0267	-0.0985	-0.2272	-0.1525
RAMOS--7	0.1616	0.0512	0.4440	0.4623	0.0454	0.1244	-0.0706	-0.0277	0.2155	0.2402
RAMOS--8	0.0014	0.0474	-0.0671	-0.0572	-0.2184	-0.2321	-0.1374	-0.1985	-0.0758	0.0192
RAMOS--9	-0.0366	0.0089	0.2596	0.2908	0.0330	0.0867	-0.2195	-0.0247	-0.1087	0.0948
RAMOS-10	0.0287	-0.0478	0.1172	-0.2180	-0.2429	-0.0781	0.1403	0.0228	0.1504	0.1502
RAMOS-11	0.1461	0.0858	0.3390	0.1597	0.0685	-0.0191	-0.0273	0.1311	0.0839	0.0112
RAMOS-12	0.0902	0.0643	0.0130	-0.2250	-0.1906	0.2309	0.0080	-0.0669	0.1830	0.1206
RAMOS-13	-0.1606	-0.0923	-0.0703	-0.1208	-0.2102	-0.0075	-0.1209	-0.1492	0.1487	0.1236
RAMOS-14	-0.1085	0.1406	-0.1155	-0.2111	0.1892	0.0452	-0.1091	-0.0050	-0.1094	0.0350
RAMOS-15	0.0681	-0.0312	0.3793	0.4154	0.0137	-0.0136	-0.1300	-0.0473	-0.0477	0.0437
RAMOS-16	-0.0985	0.0369	-0.0566	0.1950	0.0200	0.0988	-0.1267	0.1114	-0.0866	0.0716
RAMOS-17	0.1042	-0.0930	0.0869	-0.1109	-0.1736	-0.1177	0.0734	0.0030	-0.0878	-0.0361
RAMOS-18	-0.0103	0.0329	0.0638	-0.0691	-0.0811	-0.0053	-0.1022	-0.0908	0.0867	-0.0840
RAMOS-19	0.0915	-0.1302	-0.1673	-0.1589	-0.1685	0.0719	0.4369	0.3142	0.1206	0.1911
RAMOS-20	-0.0361	-0.1268	0.0713	0.0677	-0.1376	-0.1593	-0.0687	-0.0809	-0.0778	0.1345

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Grade 5 Reading (continued)

	WD-----1	WD-----2	WD-----3	WD-----4	WD-----5	WD-----6	WD-----7	WD-----8	WD-----9	WD----10
APPLE--1	-0.1833	-0.1928	-0.0547	-0.2127	-0.2303	-0.0632	-0.1150	-0.0369	0.0287	-0.0393
APPLE--2	-0.1245	0.1781	-0.0265	-0.2205	-0.0582	-0.0476	-0.0766	0.0581	0.0252	0.1842
APPLE--3	-0.0870	-0.0492	-0.0724	-0.2185	-0.0342	0.0446	0.1887	0.2104	0.1099	-0.0790
APPLE--4	0.5224	0.2462	0.2533	0.4285	0.1767	0.2143	0.4429	0.2719	0.2346	0.0269
APPLE--5	-0.1551	-0.0441	-0.0937	-0.0456	0.0301	0.1349	0.0188	0.1463	0.1684	-0.0563
APPLE--6	-0.0665	0.1257	0.0616	-0.1740	0.1091	0.0314	-0.0410	0.2575	-0.0413	-0.0248
APPLE--7	-0.1721	0.0[illegible]1	-0.3518	-0.2449	-0.1042	-0.0213	-0.0729	-0.1184	-0.3470	-0.3464
APPLE--8	-0.1705	0.0[illegible]1	0.3041	0.0398	0.1670	0.0945	-0.1471	-0.1567	0.0192	-0.1271
APPLE--9	-0.1565	-0.1600	0.1466	-0.0568	0.1260	-0.2525	-0.1558	-0.0914	0.0106	0.0061
APPLE-10	-0.0364	-0.0102	0.2491	0.3184	0.2909	0.0327	-0.0254	-0.0557	0.2378	0.1515
APPLE-11	0.0512	-0.1564	-0.0172	0.1613	0.1243	-0.1950	0.0132	-0.0519	-0.1580	-0.0352
APPLE-12	-0.0723	-0.1132	-0.0618	0.0242	-0.0010	-0.1500	-0.1117	-0.1333	-0.0876	0.0347
APPLE-13	0.0719	0.1889	-0.2619	-0.1799	-0.1773	-0.1572	-0.0497	-0.1270	0.2181	0.0493
APPLE-14	-0.0250	-0.0809	-0.0526	0.0007	-0.0050	-0.0884	-0.0684	-0.1033	-0.1102	-0.0753
APPLE-15	0.0743	0.2895	-0.0322	0.1111	-0.0299	0.2550	0.0736	0.1586	0.0421	-0.0991
APPLE-16	-0.0550	0.0814	0.1711	-0.0040	-0.0667	0.1487	-0.1041	-0.1372	-0.0154	0.1175
APPLE-17	0.2195	0.2523	-0.0705	0.0623	0.0054	0.1583	0.0752	0.1557	-0.2090	-0.0167
APPLE-19	0.2032	-0.1745	0.0524	0.0558	-0.0039	-0.0222	0.3519	0.0710	0.1945	0.0599
APPLE-20	0.1750	0.3863	0.2181	0.2835	0.2237	0.2179	-0.0803	0.0224	-0.0307	-0.0403
APPLE-21	-0.2524	-0.1355	-0.2369	-0.2128	0.2952	-0.2721	-0.1111	-0.1381	-0.2881	-0.3074
APPLE-22	-0.3389	-0.3003	-0.2432	-0.1402	-0.1792	0.0074	-0.0386	-0.0394	0.1949	0.1288
APPLE-23	0.0636	0.3787	0.2033	-0.0013	-0.0329	0.0392	-0.1974	0.0052	-0.0916	-0.0240
APPLE-24	-0.0647	-0.1073	0.2971	0.1846	0.0344	0.3137	0.2134	0.1927	0.2170	-0.0529
APPLE-25	0.1780	-0.3181	0.2579	0.0108	-0.0517	-0.0580	0.3302	0.2285	-0.0230	-0.0045
APPLE-26	0.0669	0.1215	0.0141	-0.0111	-0.0094	0.1021	-0.1072	0.0829	0.2263	0.0280
APPLE-27	-0.0819	-0.0708	-0.2911	-0.2692	0.3812	-0.1183	-0.0764	-0.1393	-0.2063	-0.1898
APPLE-28	-0.1029	-0.0373	-0.1540	-0.1308	-0.0056	-0.0239	-0.1241	-0.1590	0.0159	-0.0079
APPLE-29	-0.1008	-0.0238	-0.1725	0.0495	-0.0646	0.1575	0.1343	0.0489	-0.1036	-0.0574
APPLE-30	0.1988	-0.0702	-0.1325	-0.0299	-0.2274	-0.1510	0.3125	0.0575	0.0421	0.0037

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Grade 5 Reading (continued)

	WD-----1	WD-----2	WD-----3	WD-----4	WD-----5	WD-----6	WD-----7	WD-----8	WD-----9	WD----10
APPLE-31	-0.0852	0.0650	-0.1183	-0.1157	-0.1504	-0.2928	-0.1570	-0.2002	0.1878	0.1978
APPLE-32	-0.0671	-0.0384	-0.0744	0.0855	-0.0732	-0.1564	-0.0819	-0.1218	-0.0491	0.2031
APPLE-33	-0.2409	0.0021	0.1244	0.1136	-0.0860	0.1254	-0.0749	-0.0910	-0.1353	-0.1344
APPLE-34	-0.1662	0.0675	0.0082	-0.1094	0.0407	0.0999	-0.1702	-0.0699	-0.0963	-0.1291
APPLE-35	-0.1616	-0.1876	-0.1953	-0.0348	-0.1357	0.0201	0.0083	0.1149	0.1706	0.1113
APPLE-36	-0.0849	0.0408	0.1682	-0.0356	0.1360	0.1606	-0.0171	0.1630	0.0373	-0.0556
APPLE-37	0.1483	-0.0206	-0.1631	0.1438	-0.1414	-0.2844	0.0434	-0.1037	0.1325	0.2514
APPLE-38	0.1494	0.4612	0.2137	0.1761	0.1941	0.2776	-0.1381	0.0787	0.1456	-0.0300
APPLE-39	-0.1996	0.1405	-0.0182	0.1107	0.0806	0.0961	-0.0759	-0.1257	0.0343	-0.1278
APPLE-40	-0.1120	0.0079	-0.0170	0.3031	-0.0213	-0.1699	-0.1792	-0.1631	0.0326	0.0467
APPLE-41	-0.0593	0.1303	-0.0659	0.0655	0.0374	0.1559	-0.0485	-0.0060	-0.3360	-0.1887
APPLE-42	-0.2054	0.0180	-0.0038	-0.0635	-0.0506	-0.1116	-0.0195	0.2193	-0.0525	0.0869
APPLE-43	0.0460	0.1770	0.0112	0.0930	0.0996	0.0776	-0.1228	0.1842	-0.0776	0.0478
APPLE-44	-0.0809	0.0879	-0.1243	0.0018	-0.0033	0.1008	-0.0058	0.0009	-0.0533	-0.2100
APPLE-45	-0.1167	0.4166	-0.1735	-0.2542	0.0036	-0.0717	-0.2316	-0.2624	-0.0196	-0.2289
APPLE-46	-0.0750	-0.1613	-0.0229	-0.1049	-0.2117	0.1491	0.0726	0.1428	0.0514	0.0344
APPLE-47	-0.0039	0.3057	-0.1125	0.0092	-0.1661	0.0883	-0.0933	-0.1508	0.0767	0.0208
APPLE-48	0.0486	-0.0515	0.0399	0.0478	-0.1149	0.0456	-0.1371	0.0473	0.0471	-0.0223
APPLE-49	-0.0104	0.0630	-0.0755	-0.0111	0.0779	0.1761	-0.1919	-0.1199	-0.0660	-0.2398
APPLE-50	-0.2710	-0.1147	-0.0995	-0.1347	0.0751	-0.1400	-0.2435	-0.1903	-0.1561	-0.2021
CATRC-GN	-0.2905	-0.0627	-0.4191	-0.3487	0.0072	-0.0958	0.0473	0.1859	-0.0757	-0.0808
RAPPL-GN	0.2822	0.0841	-0.1902	0.1003	-0.1774	-0.0889	0.1266	0.0519	-0.0023	0.1961
DECOD-GN	0.2857	0.0703	0.0486	0.1717	-0.2264	-0.2059	0.1006	0.1422	0.1654	0.0919
RACH.-GN	-0.0244	-0.0594	-0.2393	-0.2519	-0.1451	-0.0650	-0.0826	-0.0297	0.0638	0.2227
TOTRD-GN	0.0648	-0.0264	-0.3919	-0.1817	-0.1938	-0.1580	0.0397	0.0611	-0.0018	0.2148

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Grade 5 Reading (continued)

	WD----11	WD----12	WD----13	WD----14	WD----15	WD----16	WD----17	WD----18	WD----19	WD----20
WC-----1	0.3281	0.2968	-0.1360	-0.2670	-0.2440	-0.3253	0.2512	0.1447	0.3128	0.2517
WC-----2	-0.1560	-0.1058	-0.1943	-0.0610	-0.1460	-0.1887	0.2939	0.2497	0.1343	0.2336
WC-----3	0.1217	0.1458	-0.3594	-0.3273	-0.2060	-0.1864	0.0849	0.0995	0.1455	0.0526
WC-----4	-0.0187	0.0767	-0.1684	-0.2615	-0.0534	-0.1333	0.0858	0.1791	0.0745	0.0156
WC-----5	0.1097	-0.1302	-0.1680	-0.0078	-0.1611	-0.3069	0.2600	0.2926	0.1542	0.1418
WC-----6	0.0442	0.0995	-0.2858	-0.3275	-0.2636	-0.2272	0.3854	0.4047	0.2765	0.2285
WC-----7	0.0919	0.1111	-0.0624	-0.2318	-0.1160	-0.1721	0.5782	0.4553	0.6253	0.4976
WC-----8	-0.0117	-0.0031	-0.1854	-0.3057	-0.1764	-0.2137	0.6104	0.5583	0.6687	0.6858
WC-----9	0.6734	0.7232	-0.1214	-0.2739	-0.1069	-0.1906	0.0358	-0.0304	-0.0439	-0.0811
WC----10	0.4230	0.4667	-0.1694	-0.2756	-0.1613	-0.4047	0.0738	0.0617	0.0988	-0.0056
WC----11	1.0000	0.7874	-0.1414	-0.0374	-0.1020	-0.1941	0.0501	0.0425	0.0620	0.0027
WC----12	0.7874	1.0000	0.0101	-0.1182	-0.0684	-0.1295	0.0448	-0.0346	0.0334	-0.0519
WC----13	-0.1414	0.0101	1.0000	0.5607	0.6118	0.5295	-0.1848	-0.1547	-0.1085	-0.1282
WC----14	-0.0374	-0.1182	0.5607	1.0000	0.4097	0.4747	-0.2974	-0.2148	-0.2678	-0.1840
WC----15	-0.1020	-0.0684	0.6118	0.4097	1.0000	0.7393	-0.1230	-0.0864	-0.0625	-0.2339
WC----16	-0.1941	-0.1295	0.5295	0.4747	0.7393	1.0000	-0.1900	-0.1354	-0.1925	-0.2343
WC----17	0.0501	0.0448	-0.1848	-0.2974	-0.1230	-0.1900	1.0000	0.8347	0.7763	0.7685
WC----18	0.0425	-0.0346	-0.1547	-0.2148	-0.0864	-0.1354	0.8347	1.0000	0.7288	0.5783
WC----19	0.0620	0.0334	-0.1085	-0.2678	-0.0625	-0.1925	0.7763	0.7288	1.0000	0.6106
WC----20	0.0027	-0.0519	-0.1282	-0.1840	-0.2339	-0.2343	0.7685	0.5783	0.6106	1.0000
WC----21	0.3724	0.4345	-0.1228	-0.2006	0.1500	0.0523	0.0888	0.0904	0.0707	-0.0355
WC----22	0.4585	0.4918	-0.1277	-0.1989	0.0580	0.0407	-0.0015	-0.0650	-0.0251	0.0097
WC----23	-0.1132	-0.1867	0.0355	0.0000	-0.1110	-0.0328	-0.1750	-0.1427	-0.1521	0.0000
WC----24	-0.1133	0.0429	-0.1067	-0.1751	-0.0748	-0.1786	-0.2590	-0.2776	-0.3772	-0.4075
WC----25	0.0500	-0.0658	-0.1539	-0.1628	-0.1159	-0.0629	0.2666	0.3799	0.3602	0.2931
WC----26	0.0167	0.0263	0.0689	0.2571	0.1570	0.2760	-0.1341	-0.1863	-0.0730	-0.1221
WC----27	0.1161	0.1748	-0.1211	-0.1381	-0.1311	-0.0673	0.2326	0.1621	0.1476	0.2550
WC----28	-0.0098	-0.0145	-0.1126	-0.1975	-0.1172	-0.1083	0.6591	0.6245	0.5766	0.7110
WC----29	-0.1013	-0.0879	-0.1046	-0.2605	-0.1366	-0.1509	0.6980	0.5460	0.6307	0.7435
WC----30	0.2125	0.1201	-0.0041	0.0402	-0.1473	-0.1416	0.4787	0.5875	0.5211	0.6595
WC----31	-0.0466	-0.0821	-0.1242	-0.2208	-0.0625	-0.0821	0.4743	0.3873	0.5232	0.6106
WC----32	0.2014	0.1642	-0.0813	-0.0569	-0.0012	-0.0468	0.0910	0.1651	0.1344	-0.1657
WC----33	-0.1571	-0.2483	0.0327	-0.0278	-0.1236	-0.0795	0.2172	0.2576	0.2256	0.2205
WC----34	-0.0995	0.1350	0.0419	-0.1477	-0.1463	-0.1621	0.0954	0.1085	0.1177	0.0362

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Grade 5 Reading (continued)

	WD----11	WD----12	WD----13	WD----14	WD----15	WD----16	WD----17	WD----18	WD----19	WD----20
RAMOS--1	-0.1374	-0.0270	-0.1435	-0.0644	-0.0918	-0.0178	-0.1274	-0.0936	-0.1370	-0.0628
RAMOS--2	-0.0720	0.0341	-0.2925	-0.3833	-0.1030	-0.1939	0.0725	0.0273	-0.0691	0.1347
RAMOS--3	-0.0397	-0.0055	0.1923	0.3636	0.0395	0.1717	-0.1986	-0.0877	-0.0826	-0.1606
RAMOS--4	-0.1106	-0.1835	-0.1424	-0.0208	-0.0962	-0.0569	-0.0654	-0.0151	-0.0416	-0.1001
RAMOS--5	-0.0333	0.0292	-0.0465	-0.1733	-0.0299	0.1036	-0.0051	-0.1833	0.0266	-0.0536
RAMOS--6	-0.0423	-0.1431	0.0100	0.0710	-0.1196	-0.1493	-0.2008	-0.1705	0.0033	-0.1912
RAMOS--7	-0.0056	0.1371	-0.1141	-0.1273	0.0491	-0.0181	0.0307	0.0302	0.0090	-0.1196
RAMOS--8	0.0350	-0.0232	0.1288	0.1085	0.0198	0.0780	-0.1123	-0.1573	-0.1075	0.0682
RAMOS--9	-0.1977	-0.1045	0.0385	0.1530	-0.0060	-0.0189	-0.1771	-0.0688	-0.1175	-0.1069
RAMOS-10	0.1682	0.0425	-0.1464	-0.0862	-0.0307	-0.0727	0.0597	-0.1161	-0.0109	0.1915
RAMOS-11	0.0247	-0.0371	0.0202	0.1825	-0.0977	0.0305	-0.1655	-0.1072	-0.1242	0.0088
RAMOS-12	0.2272	0.2139	-0.0303	-0.0311	-0.0590	-0.0359	0.0321	0.0144	0.0587	0.0202
RAMOS-13	0.1724	0.1381	0.1617	0.1552	0.3274	0.1749	-0.1579	-0.1355	-0.1468	-0.1187
RAMOS-14	0.1120	-0.0542	-0.1741	0.0756	-0.0572	-0.1453	-0.0479	0.0309	0.0371	-0.1116
RAMOS-15	-0.3091	-0.2090	0.0384	0.0489	-0.0093	0.0854	-0.1169	-0.0932	-0.2021	-0.0866
RAMOS-16	-0.0925	0.0491	0.0659	0.0481	-0.0553	-0.0816	-0.1324	-0.0698	-0.1025	0.1458
RAMOS-17	0.1119	0.0238	0.0036	-0.0815	-0.1540	-0.1517	-0.0508	0.0413	0.2044	0.0276
RAMOS-18	-0.0888	0.0534	-0.1627	-0.1890	-0.1346	0.0295	0.1624	-0.1070	-0.1160	0.1542
RAMOS-19	0.1870	0.2131	-0.0408	-0.0884	-0.0262	-0.0979	0.4383	0.2872	0.4779	0.3579
RAMOS-20	-0.1677	-0.0771	-0.0775	-0.0384	0.0000	-0.0481	-0.0838	-0.0719	-0.0779	-0.0882

Grade 5 Reading (continued)

	WD----11	WD----12	WD----13	WD----14	WD----15	WD----16	WD----17	WD----18	WD----19	WD----20
APPLE--1	-0.0399	0.0025	-0.0405	0.0794	-0.0655	0.1042	-0.0393	-0.0624	-0.0690	-0.0371
APPLE--2	0.0599	0.1192	-0.2891	-0.1418	-0.1234	-0.1642	0.0430	0.0589	0.0688	0.0861
APPLE--3	0.1817	0.1011	0.1989	0.0904	0.1708	0.1509	0.2473	0.1646	0.2305	0.3391
APPLE--4	0.1130	0.0506	-0.0883	-0.0083	-0.0508	0.0741	0.2809	0.1118	0.0914	0.2862
APPLE--5	0.2094	0.2196	0.2404	0.0218	0.3069	0.3225	0.1861	0.2164	0.1631	0.1541
APPLE--6	0.0053	-0.0328	0.0376	0.0237	0.0139	-0.0566	0.0389	0.0146	0.1020	0.2224
APPLE--7	-0.3590	-0.2614	0.3226	0.1747	0.0469	0.1298	-0.0731	-0.0014	-0.0593	-0.1940
APPLE--8	-0.1014	-0.1188	0.0577	0.0319	0.2093	0.1176	-0.1551	-0.1056	-0.0997	-0.1715
APPLE--9	0.0410	-0.0908	-0.1888	-0.0110	-0.1678	-0.1428	-0.2174	-0.2403	-0.1888	-0.1278
APPLE-10	0.1950	0.0654	-0.1196	-0.0695	0.1908	0.0545	-0.0181	0.0851	0.0272	-0.1400
APPLE-11	-0.0216	-0.0790	0.1472	0.3510	0.0880	-0.0022	-0.1733	-0.0726	-0.1078	-0.0584
APPLE-12	-0.0687	-0.0896	0.0024	-0.1692	0.0953	-0.1591	0.1221	0.1934	0.1602	-0.0892
APPLE-13	0.0248	0.2584	0.1710	0.0786	-0.0937	0.0508	-0.1131	-0.1696	-0.1350	-0.0976
APPLE-14	-0.0907	-0.1845	-0.0544	-0.1389	-0.0688	-0.1327	-0.0176	0.0415	-0.0335	-0.0271
APPLE-15	-0.1488	-0.0096	-0.0697	-0.1000	0.0458	-0.0307	0.1211	0.1656	0.2066	0.1377
APPLE-16	-0.1397	-0.0335	-0.0664	-0.2190	0.0245	-0.0356	0.0873	0.0406	0.0057	-0.0908
APPLE-17	-0.1233	-0.1722	-0.0913	-0.1616	-0.1878	-0.2478	-0.1170	-0.1577	0.0321	0.1206
APPLE-19	0.1537	0.0828	0.2103	0.2071	0.1803	0.1377	0.0261	-0.0429	-0.0249	-0.0198
APPLE-20	-0.0435	-0.0446	-0.2832	-0.2342	-0.1268	-0.0447	0.2263	0.2295	0.1212	0.1308
APPLE-21	-0.1146	-0.2658	0.0786	0.3746	-0.0039	0.0597	-0.1242	-0.0922	-0.1266	-0.1304
APPLE-22	0.3263	0.3298	0.0722	0.0574	0.0050	0.0189	-0.0608	0.0266	-0.0027	-0.0418
APPLE-23	-0.2615	-0.1389	-0.1720	-0.2399	-0.0273	-0.1199	-0.1089	-0.1504	-0.0532	0.0214
APPLE-24	0.1386	0.2357	-0.0414	-0.0775	-0.0393	0.0197	0.1607	0.2004	0.1763	0.1101
APPLE-25	-0.0216	-0.0957	-0.1077	-0.0424	-0.1901	-0.0716	-0.0323	0.0117	-0.0161	-0.0117
APPLE-26	0.2131	0.2475	-0.0719	-0.3078	-0.0738	-0.0824	0.0137	0.0313	0.1126	0.0498
APPLE-27	-0.0174	-0.2098	0.1615	0.4152	-0.0555	0.0360	-0.0892	-0.0451	-0.1522	-0.1317
APPLE-28	-0.1335	-0.1998	0.0656	-0.0951	0.1195	-0.0140	-0.1459	-0.1120	-0.1339	-0.1463
APPLE-29	-0.0885	-0.1258	0.2285	0.1070	0.4947	0.4197	0.0991	0.1494	-0.0502	-0.0002
APPLE-30	-0.0415	0.0273	0.2403	-0.0379	0.0385	-0.0526	0.0676	-0.0393	0.0141	0.0795

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Grade 5 Reading (continued)

	WD----11	WD----12	WD----13	WD----14	WD----15	WD----16	WD----17	WD----18	WD----19	WD----20
APPLE-31	0.1368	0.2797	0.0711	0.0723	-0.0223	-0.1053	-0.2219	-0.1811	-0.1895	-0.1828
APPLE-32	-0.0092	-0.1634	-0.1451	-0.1282	-0.0450	-0.0514	-0.1541	-0.1434	-0.1032	-0.0689
APPLE-33	-0.1347	-0.1044	0.0064	0.2395	-0.1763	0.1232	-0.0345	0.0454	-0.0133	0.0237
APPLE-34	-0.2280	-0.2869	-0.0669	-0.1260	0.1470	0.0968	-0.1317	-0.1727	-0.2096	-0.0824
APPLE-35	0.2256	0.2629	-0.0490	0.0007	0.0715	0.0009	0.0519	0.0963	0.1006	0.0479
APPLE-36	0.0530	-0.0176	-0.0532	-0.0931	-0.0785	-0.1079	0.1551	0.0406	0.0387	0.2314
APPLE-37	-0.0431	-0.0627	-0.0511	-0.0660	-0.0336	-0.0994	-0.0654	-0.1611	-0.0457	0.0028
APPLE-38	-0.0024	0.0624	-0.3068	-0.2145	-0.0148	-0.1165	0.1928	0.2082	0.2358	0.1058
APPLE-39	-0.2407	-0.1968	0.0536	-0.2197	0.1515	0.0935	-0.0137	0.0625	-0.1765	-0.1128
APPLE-40	-0.1585	-0.0617	-0.0543	0.0589	0.1400	0.0785	-0.2001	-0.1526	-0.1832	-0.1844
APPLE-41	-0.1970	-0.1992	0.0216	0.1553	-0.1270	0.0156	0.1199	0.1901	0.0214	0.1540
APPLE-42	-0.0647	-0.0536	-0.0036	0.0553	-0.0482	-0.0261	0.0224	0.0628	0.1629	0.1106
APPLE-43	-0.0960	-0.1127	-0.1326	-0.0853	0.1258	0.0452	0.0075	0.0272	0.0407	0.0421
APPLE-44	0.0510	0.0382	-0.0977	-0.1080	-0.0561	0.1350	-0.0194	0.0140	-0.1071	-0.0138
APPLE-45	-0.1139	-0.1861	-0.0324	0.0575	0.0144	0.0012	0.0207	-0.1166	0.0034	0.0640
APPLE-46	0.0625	0.1492	-0.0763	-0.2222	-0.2121	-0.1686	0.1620	0.1953	0.2606	0.1902
APPLE-47	-0.0563	0.0413	-0.1069	-0.0246	0.1249	-0.0009	0.0732	0.1394	0.0287	-0.1763
APPLE-48	0.1867	0.0695	-0.2218	-0.0540	-0.0496	-0.0085	0.0156	0.0301	0.0012	0.1381
APPLE-49	0.0592	0.0387	0.2660	0.1243	0.3319	0.3079	-0.1656	-0.1472	-0.1477	-0.2004
APPLE-50	0.0376	-0.0426	-0.0397	0.0155	0.0696	0.0925	-0.2513	-0.2104	-0.2800	-0.1884
CATRC-GN	0.0332	0.1181	-0.0980	-0.0088	-0.0631	-0.0784	0.1261	0.0386	0.1477	0.1589
RAPPL-GN	0.0068	0.0223	-0.0412	-0.1593	-0.0332	-0.0471	0.2246	0.1878	0.1693	0.1617
CECOD-GN	-0.1081	0.0133	-0.0979	-0.2694	-0.0746	-0.0148	0.2562	0.1989	0.1644	0.3020
RACH.-GN	-0.0246	0.0077	-0.0168	-0.0150	0.0305	-0.0398	-0.0569	-0.0418	-0.1493	-0.0718
TOTRD-GN	0.0127	0.0631	-0.0787	-0.0991	-0.0339	-0.0901	0.1541	0.0975	0.0781	0.0998

Grade 5 Reading (continued)

	WD----21	WD----22	WD----23	WD----24	WD----25	WD----26	WD----27	WD----28	WD----29	WD----30
WD-----1	0.0374	0.1876	-0.1928	-0.0317	0.1871	0.1261	-0.2028	0.2091	0.2114	0.1848
WD-----2	0.0951	0.1567	-0.2766	0.2438	0.0476	-0.1506	-0.0389	0.3026	0.3271	0.1157
WD-----3	0.0089	0.1088	-0.2764	-0.0009	0.2976	-0.0594	-0.0877	-0.0254	-0.0023	0.1074
WD-----4	-0.0597	0.0612	-0.1944	0.0134	0.2562	0.1833	-0.1839	0.0329	0.0152	0.0459
WD-----5	-0.2474	-0.2093	-0.3722	0.1172	0.1506	-0.0986	-0.1816	0.1854	0.2183	0.1663
WD-----6	0.1557	0.0772	-0.3138	0.1560	0.1570	-0.2671	0.0527	0.3289	0.3225	0.1761
WD-----7	0.0379	0.0274	-0.0987	-0.3351	0.0432	0.1691	0.0288	0.5592	0.5841	0.4252
WD-----8	-0.0761	-0.0243	-0.1397	-0.3243	0.2132	-0.0028	0.0272	0.6635	0.6537	0.5475
WD-----9	0.4271	0.5341	-0.2252	0.0496	0.0716	0.1040	0.0303	-0.1785	-0.2172	0.0073
WD----10	0.2374	0.2671	0.0032	-0.0805	0.0261	0.0251	-0.0448	-0.0372	-0.1116	0.1271
WD----11	0.3724	0.4585	-0.1132	-0.1133	0.0500	0.0167	0.1161	-0.0098	-0.1013	0.2125
WD----12	0.4345	0.4918	-0.1867	0.0429	-0.0658	0.0263	0.1748	-0.0145	-0.0879	0.1201
WD----13	-0.1228	-0.1277	0.0355	-0.1067	-0.1539	0.0689	-0.1211	-0.1126	-0.1046	-0.0041
WD----14	-0.2006	-0.1989	0.0000	-0.1751	-0.1628	0.2571	-0.1381	-0.1975	-0.2605	0.0402
WD----15	0.1500	0.0580	-0.1110	-0.0748	-0.1159	0.1570	-0.1311	-0.1172	-0.1366	-0.1473
WD----16	0.0523	0.0407	-0.0328	-0.1786	-0.0629	0.2760	-0.0673	-0.1083	-0.1509	-0.1416
WD----17	0.0888	-0.0015	-0.1750	-0.2590	0.2666	-0.1341	0.2326	0.6591	0.6980	0.4787
WD----18	0.0904	-0.0650	-0.1427	-0.2776	0.3799	-0.1863	0.1621	0.6245	0.5460	0.5875
WD----19	0.0707	-0.0251	-0.1521	-0.3772	0.3602	-0.0730	0.1476	0.5766	0.6307	0.5211
WD----20	-0.0355	0.0097	0.0000	-0.4075	0.2931	-0.1221	0.2550	0.7110	0.7435	0.6595
WD----21	1.0000	0.6732	-0.2408	0.0103	0.1887	-0.0310	0.0892	0.0480	-0.1043	0.0898
WD----22	0.6732	1.0000	-0.0573	-0.0680	0.3197	-0.0049	-0.0447	-0.0099	-0.1364	0.1144
WD----23	-0.2408	-0.0573	1.0000	-0.2397	-0.1915	-0.1021	0.3445	-0.0097	-0.0279	0.1042
WD----24	0.0103	-0.0680	-0.2397	1.0000	-0.3110	-0.4238	-0.0199	-0.2590	-0.2103	-0.4347
WD----25	0.1887	0.3197	-0.1915	-0.3110	1.0000	-0.0246	-0.0951	0.1371	0.1045	0.3520
WD----26	-0.0310	-0.0049	-0.1021	-0.4238	-0.0246	1.0000	-0.1601	-0.1341	-0.1613	-0.1289
WD----27	0.0892	-0.0447	0.3445	-0.0199	-0.0951	-0.1601	1.0000	0.2326	0.3410	0.2539
WD----28	0.0480	-0.0099	-0.0097	-0.2590	0.1371	-0.1341	0.2326	1.0000	0.8849	0.6267
WD----29	-0.1043	-0.1364	-0.0279	-0.2103	0.1045	-0.1613	0.3410	0.8849	1.0000	0.5544
WD----30	0.0898	0.1144	0.1042	-0.4347	0.3520	-0.1289	0.2539	0.6267	0.5544	1.0000
WD----31	-0.1191	-0.0251	0.0326	-0.2527	0.0709	-0.0730	0.1476	0.7210	0.6307	0.3184
WD----32	-0.0788	-0.1513	-0.0265	0.0091	0.0096	0.1909	0.1592	0.0086	-0.0410	-0.1863
WD----33	-0.1708	-0.1477	0.0882	0.0219	0.1456	-0.3009	-0.0489	-0.0291	0.0260	-0.0304
WD----34	0.1056	0.0612	-0.2056	0.0231	0.0576	0.0320	-0.1534	0.2115	0.1495	0.1458

Grade 5 Reading (continued)

	WD----21	WD----22	WD----23	WD----24	WD----25	WD----26	WD----27	WD----28	WD----29	WD----30
RAMOS--1	-0.0457	0.0902	0.0161	0.0220	0.2598	0.1148	0.0274	-0.1295	-0.1222	0.1106
RAMOS--2	0.1232	0.2022	-0.0933	0.0977	0.3082	-0.0164	0.1160	-0.0166	0.0745	0.0603
RAMOS--3	-0.1878	-0.0836	0.1238	-0.1151	-0.0811	0.2260	-0.0236	-0.1584	-0.2103	0.1058
RAMOS--4	-0.0916	-0.1437	0.0810	0.0336	0.1617	-0.1502	-0.0169	-0.0449	-0.0880	0.0217
RAMOS--5	0.1740	0.1553	-0.1592	0.1154	0.0668	-0.0568	-0.2227	0.1594	0.0944	-0.1815
RAMOS--6	-0.1655	-0.0915	0.0356	0.2571	-0.0805	-0.2473	-0.0242	-0.1889	-0.0596	-0.1095
RAMOS--7	0.0843	0.0467	-0.2021	0.0344	0.1874	0.0819	-0.0281	-0.1402	-0.1853	-0.0645
RAMOS--8	-0.0099	0.1832	0.2912	-0.1003	-0.0070	-0.1753	0.1543	-0.0090	0.0884	0.1964
RAMOS--9	-0.3068	-0.1668	-0.0573	0.1053	0.1832	0.0423	-0.0441	-0.1064	-0.0748	0.0570
RAMOS-10	0.2249	0.1949	0.1157	-0.0745	-0.0045	-0.1662	0.3246	0.0910	0.1170	0.1511
RAMOS-11	-0.1454	-0.0060	-0.2232	0.0247	0.0629	-0.0008	-0.2629	-0.0335	-0.1063	0.0869
RAMOS-12	0.1694	0.1775	0.1353	0.0341	-0.0741	-0.0974	-0.0983	0.0081	-0.0344	0.0798
RAMOS-13	0.2778	0.1599	-0.0123	0.0625	-0.1798	-0.0804	0.2408	-0.1229	-0.1474	-0.0475
RAMOS-14	0.0287	0.0291	-0.0726	0.2376	-0.0185	-0.1852	-0.1038	-0.0022	-0.0288	0.0765
RAMOS-15	-0.3529	-0.2419	-0.0139	-0.0811	0.1408	0.1628	-0.2498	-0.1608	-0.1728	-0.1164
RAMOS-16	-0.0159	0.1176	0.0055	-0.1113	0.3493	0.0150	0.1797	0.1234	0.0523	0.1686
RAMOS-17	-0.1731	-0.0231	0.4588	-0.1448	0.0386	-0.1885	0.2246	0.0632	0.1596	0.2724
RAMOS-18	-0.0559	-0.0321	0.0045	0.2143	-0.1419	-0.0049	0.4895	-0.1333	0.1052	-0.0878
RAMOS-19	0.2599	0.1174	-0.1077	-0.1656	0.1170	-0.0192	0.2310	0.4046	0.3494	0.2865
RAMOS-20	-0.0286	-0.0538	-0.0702	0.1438	-0.0953	-0.1252	-0.0830	-0.0895	-0.1008	-0.0590

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Grade 5 Reading (continued)

	WD----21	WD----22	WD----23	WD----24	WD----25	WD----26	WD----27	WD----28	WD----29	WD----30
APPLE--1	-0.0770	0.0653	0.3206	-0.2717	0.0897	0.2200	0.0440	-0.1171	-0.0941	-0.0367
APPLE--2	0.1506	0.1788	-0.1160	0.1356	0.0384	-0.1091	-0.0686	0.0711	0.0651	0.1886
APPLE--3	0.1605	0.1662	0.0740	-0.1285	0.2003	-0.1276	0.2188	0.2408	0.2514	0.3907
APPLE--4	-0.1323	0.0669	-0.1522	-0.2191	-0.1416	0.3465	-0.0252	0.1697	0.1706	0.0480
APPLE--5	0.3419	0.1439	-0.1749	-0.0280	0.1276	-0.1886	0.0619	0.2046	0.1966	0.2293
APPLE--6	0.0276	0.0923	0.0352	-0.0130	0.1518	-0.1145	-0.0065	0.1697	0.1697	0.2559
APPLE--7	-0.2875	-0.3026	0.2872	0.0607	-0.2890	-0.0572	0.0795	0.0000	0.0658	-0.2003
APPLE--8	-0.0553	-0.0662	-0.0590	0.0587	0.0448	-0.1627	-0.1295	-0.1569	-0.1732	-0.0759
APPLE--9	-0.2395	-0.2026	0.1160	-0.0164	0.0600	-0.0360	-0.1541	-0.1361	-0.1535	-0.1216
APPLE-10	0.0488	0.0544	-0.1728	-0.0559	0.0945	0.0836	0.0335	-0.1259	-0.1613	0.0360
APPLE-11	-0.0517	-0.0134	-0.0399	0.0086	-0.0364	-0.0376	-0.1759	-0.1312	-0.1757	0.1117
APPLE-12	0.1444	-0.0245	0.0808	0.0817	0.0197	-0.1143	0.2868	-0.0534	-0.1035	-0.1516
APPLE-13	0.1575	0.0456	-0.1328	0.0731	-0.2675	0.0388	-0.0443	0.0644	0.0506	-0.1250
APPLE-14	0.2844	0.0524	0.1476	0.0042	-0.0681	-0.1171	0.0380	-0.0364	-0.1062	-0.0864
APPLE-15	0.2722	0.1237	-0.2186	0.0236	0.3777	0.0830	0.0482	0.0583	0.1525	0.1600
APPLE-16	0.1113	0.0325	-0.1462	-0.0522	0.2003	0.0050	0.1032	-0.0338	0.0234	-0.1229
APPLE-17	-0.0589	0.0191	0.0906	0.2024	-0.0662	-0.0241	0.0204	0.1295	0.2228	-0.0368
APPLE-19	0.0552	-0.0243	-0.1121	-0.3296	-0.0389	0.3952	-0.0813	0.0076	-0.0581	-0.0438
APPLE-20	-0.0064	0.1011	-0.1148	0.2474	0.0361	-0.2446	0.1492	0.1880	0.1846	0.0067
APPLE-21	-0.1091	-0.3408	0.0477	-0.2116	-0.1055	0.2552	0.0062	-0.1425	-0.1631	-0.0917
APPLE-22	0.2204	0.0637	0.0908	-0.1417	0.0158	-0.0258	0.1517	0.0086	-0.0347	0.1756
APPLE-23	0.1557	0.2034	-0.0963	0.2925	0.1102	-0.1896	-0.0249	-0.0374	0.0672	-0.0168
APPLE-24	0.1483	0.0155	-0.1712	-0.0619	0.0883	-0.0392	0.4330	0.0489	0.0705	0.2203
APPLE-25	-0.0054	-0.0698	0.1717	-0.0637	0.0337	0.0937	0.1398	-0.0194	-0.0486	0.0989
APPLE-26	0.1786	0.2947	0.1121	0.0729	0.1299	-0.1386	0.2081	-0.0086	0.0341	0.0759
APPLE-27	-0.2489	-0.3775	-0.0480	-0.3001	-0.1584	0.3293	-0.1205	-0.0877	-0.1168	-0.0957
APPLE-28	0.1179	0.0228	0.0404	0.1817	-0.1474	-0.1585	0.0192	-0.1281	-0.1528	-0.0717
APPLE-29	0.0865	0.0671	-0.0831	-0.0604	0.0395	0.0663	0.0025	0.0556	0.0688	-0.0121
APPLE-30	-0.1369	0.0618	0.3654	-0.0256	-0.2224	0.0077	-0.0624	0.1048	0.0565	-0.0015

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Grade 5 Reading (continued)

	WD----21	WD----22	WD----23	WD----24	WD----25	WD----26	WD----27	WD----28	WD----29	WD----30
APPLE-31	0.0787	0.1243	-0.0800	0.2459	-0.0968	-0.0208	-0.1403	-0.1877	-0.2034	-0.0890
APPLE-32	-0.1031	-0.0019	0.4071	-0.1002	-0.0501	-0.0163	0.0101	-0.0963	-0.0534	-0.0090
APPLE-33	-0.1055	-0.1878	-0.0002	-0.3189	-0.0015	0.1045	0.0248	-0.0495	-0.0894	0.1255
APPLE-34	0.0762	0.0330	-0.0665	0.2818	-0.1393	-0.1830	-0.1369	-0.0518	-0.0111	-0.1929
APPLE-35	0.1669	0.0948	-0.1377	-0.2006	0.0837	0.1919	0.0585	0.0798	0.0486	0.1156
APPLE-36	-0.0015	0.0935	-0.1701	0.0997	0.2593	-0.2583	0.1365	0.0734	0.1514	0.1155
APPLE-37	0.0990	0.1093	0.0097	0.0935	0.0805	0.2284	-0.0379	-0.0078	-0.0464	-0.0263
APPLE-38	0.1815	0.1857	-0.2787	0.1554	0.1817	-0.0848	0.0680	0.0491	0.0655	-0.0153
APPLE-39	0.1590	0.0390	-0.1670	0.1453	-0.0705	-0.0992	-0.1826	-0.0191	-0.0503	-0.1693
APPLE-40	0.0299	-0.1026	-0.0650	-0.1013	0.1940	0.4802	-0.0001	-0.1574	-0.1930	-0.1568
APPLE-41	-0.1455	-0.0722	0.0254	-0.2342	0.2199	0.0511	-0.1812	0.0881	0.0438	0.1921
APPLE-42	-0.1663	-0.0904	0.2508	-0.1975	0.0003	-0.1087	0.0707	0.0430	0.0742	0.1610
APPLE-43	0.0201	-0.0323	-0.2189	0.3400	-0.0810	-0.0556	-0.0984	0.1614	0.0947	-0.0743
APPLE-44	0.1175	0.1499	-0.0229	0.0430	-0.0938	-0.0749	-0.0472	0.3712	0.3231	0.0029
APPLE-45	0.1328	0.1605	0.0856	0.1801	-0.0071	-0.1628	0.2372	-0.0288	0.0329	-0.0855
APPLE-46	0.1729	0.1933	0.0403	-0.2216	0.4753	-0.0121	0.2716	0.0928	0.1544	0.2770
APPLE-47	0.1803	0.0525	-0.1017	0.0399	-0.0288	0.0969	0.0820	-0.0304	-0.0473	-0.1685
APPLE-48	0.0398	0.0406	-0.0915	-0.2163	0.2359	0.0432	-0.0928	0.0030	-0.0099	0.0078
APPLE-49	0.1578	0.1845	-0.0136	0.1029	-0.0707	-0.1105	-0.2723	-0.1150	-0.1595	-0.1672
APPLE-50	-0.0919	-0.1327	-0.0080	0.0141	-0.1440	0.0770	-0.0792	0.0602	0.0351	-0.1563
CATRC-GN	-0.0321	0.1043	0.2390	-0.1275	-0.1469	0.0337	0.1955	0.1217	0.1873	0.1564
RAPPL-GN	-0.0319	0.0160	0.3095	-0.2680	0.0083	0.1320	0.0671	0.0816	0.1033	0.1124
DECOD-GN	0.0808	0.1677	0.0049	-0.1558	0.2569	-0.0573	0.1289	0.0767	0.1509	0.0969
RACh.-GN	-0.0459	-0.3028	0.0651	0.0242	-0.2658	0.1062	0.2022	0.0241	0.0332	0.0361
TOTRD-GN	-0.1031	-0.1345	0.2969	-0.1628	-0.1878	0.1441	0.1844	0.0788	0.1289	0.1132

Grade 5 Reading (continued)

	WD----31	WD----32	WD----33	WD----34	RAMOS--1	RAMOS--2	RAMOS--3	RAMOS--4	RAMOS--5	RAMOS--6
WD-----1	0.2051	C.1284	-0.1080	-0.1227	0.0619	0.2135	-0.1284	-0.1401	0.1507	-0.1049
WD-----2	0.1496	-C.1678	-0.0868	0.1589	-0.0380	0.1790	-0.2549	0.0595	0.0209	-0.0786
WD-----3	0.0227	-0.1217	-0.0518	0.1256	0.3392	0.3232	-0.0938	0.3420	0.1613	-0.0859
WD-----4	0.0686	C.0446	-0.1137	0.0258	0.1731	0.3512	-0.1320	-0.0411	-0.0231	-0.2617
WD-----5	C.0434	0.0450	-0.0782	0.0628	-0.2240	0.0256	-0.3145	0.1018	-0.1083	0.0251
WD-----6	0.0248	-0.1760	0.0072	0.0836	-0.0821	0.2069	-0.2940	-0.0233	-0.0563	0.0025
WD-----7	0.3503	-0.0012	-0.0068	0.1642	-0.0532	0.0362	-0.0849	-0.1153	0.1147	-0.0267
WD-----8	C.5563	-0.0510	0.0441	0.1564	-0.0026	0.2357	-0.1740	-0.1412	-0.0647	-0.0985
WD-----9	-0.1754	0.1456	-0.2860	0.0352	0.1428	0.2097	-0.0815	0.0125	0.1320	-0.2272
WD----10	0.0014	0.0632	-0.1245	0.1135	0.2457	0.2528	0.0927	-0.0813	-0.1190	-0.1525
WD----11	-0.0466	0.2014	-0.1571	-0.0995	-0.1374	-0.0720	-0.0397	-0.1106	-0.0333	-0.0423
WD----12	-0.0821	C.1642	-0.2483	0.1350	-0.0270	0.0341	-0.0055	-0.1835	0.0292	-0.1431
WD----13	-0.1242	-0.0813	0.0327	0.0419	-0.1435	-0.2925	0.1923	-0.1424	-0.0465	0.0100
WD----14	-0.2208	-0.0569	-0.0278	-0.1477	-0.0644	-0.3833	0.3636	-0.0208	-0.1733	0.0710
WD----15	-0.0625	-0.0012	-0.1236	-0.1463	-0.0918	-0.1030	0.0395	-0.0962	-0.0299	-0.1196
WD----16	-0.0821	-0.0468	-0.0795	-0.1621	-0.0178	-0.1939	0.1717	-0.0569	0.1036	-0.1493
WD----17	0.4743	0.0910	0.2172	0.0954	-0.1274	0.0725	-0.1986	-0.0654	-0.0051	-0.2008
WD----18	0.3873	C.1651	0.2576	0.1085	-0.0936	0.0273	-0.0877	-0.0151	-0.1833	-0.1705
WD----19	0.5232	0.1344	0.2256	0.1177	-0.1370	-0.0691	-0.0826	-0.0416	0.0266	0.0033
WD----20	0.6106	-C.1657	0.2205	0.0362	-0.0628	0.1347	-0.1606	-0.1001	-0.0536	-0.1912
WD----21	-0.1191	-C.0788	-0.1708	0.1056	-0.0457	0.1232	-0.1878	-0.0916	0.1740	-0.1655
WD----22	-0.0251	-0.1513	-0.1477	0.0612	0.0902	0.2022	-0.0836	-0.1437	0.1553	-0.0915
WD----23	0.0326	-0.0265	0.0882	-0.2056	0.0161	-0.0933	0.1238	0.0810	-0.1597	0.0356
WD----24	-0.2527	0.0091	0.0219	0.0231	0.0220	0.0977	-0.1151	0.0336	0.1154	0.2571
WD----25	0.0709	0.0096	0.1456	0.0576	0.2598	0.3082	-0.0811	0.1617	0.0668	-0.0805
WD----26	-C.0730	C.1909	-0.3009	0.0320	0.1148	-0.0164	0.2260	-0.1502	-0.0568	-0.2473
WD----27	C.1476	0.1592	-0.0489	-0.1534	0.0274	0.1160	-0.0236	-0.0169	-0.2227	-0.0242
WD----28	0.7210	0.0086	-0.0291	0.2115	-0.1295	-0.0166	-0.1584	-0.0449	0.1594	-0.1889
WD----29	0.6307	-0.0410	0.0260	0.1495	-0.1222	0.0745	-0.2103	-0.0880	0.0944	-0.0596
WD----30	0.3184	-0.1863	-0.0304	0.1458	0.1106	0.0603	0.1058	0.0217	-0.1815	-0.1095
WD----31	1.0000	0.0968	0.2318	0.0109	-0.0447	0.0253	-0.1088	-0.0767	0.2397	-0.1568
WD----32	C.0968	1.0000	-0.1552	-0.1975	-0.0971	-0.0335	-0.1130	0.0299	0.0543	-0.0330
WD----33	0.2318	-C.1552	1.0000	-0.0101	0.0737	-0.0300	0.1245	0.0116	-0.0461	0.2982
WD----34	0.0109	-C.1975	-0.0101	1.0000	0.2515	0.0766	0.1091	0.1740	0.1843	-0.0464

Grade 5 Reading (continued)

	WD----31	WD----32	WD----33	WD----34	RAMOS--1	RAMOS--2	RAMOS--3	RAMOS--4	RAMOS--5	RAMOS--6
RAMOS--1	-0.0447	-0.0971	0.0737	0.2515	1.0000	0.4765	0.5385	0.3525	0.1087	0.1151
RAMOS--2	0.0253	-0.0335	-0.0300	0.0766	0.4765	1.0000	-0.3785	-0.0887	-0.1708	-0.0167
RAMOS--3	-0.1088	-0.1130	0.1245	0.1091	0.5385	-0.3785	1.0000	0.0756	-0.0320	0.1312
RAMOS--4	-0.0767	0.0299	0.0116	0.1740	0.3525	-0.0887	0.0756	1.0000	0.2373	0.1110
RAMOS--5	0.2397	0.0543	-0.0461	0.1843	0.1087	-0.1708	-0.0320	0.2373	1.0000	-0.0804
RAMOS--6	-0.1568	-0.0330	0.2982	-0.0464	0.1151	-0.0167	0.1312	0.1110	-0.0804	1.0000
RAMOS--7	-0.0337	0.2407	-0.1058	0.1502	0.4496	0.3413	0.1262	0.0070	0.2250	-0.3287
RAMOS--8	-0.0136	-0.4125	0.0062	-0.0061	0.1717	-0.0330	0.2708	0.0001	-0.1412	-0.0261
RAMOS--9	-0.0727	0.0033	0.0939	0.1860	0.6863	0.2915	0.4773	0.1204	-0.0329	0.2502
RAMOS-10	0.1712	-0.2351	0.0705	-0.0318	0.4182	0.3185	0.0338	0.2328	0.2022	0.1456
RAMOS-11	0.1020	-0.0932	0.0372	0.1523	0.4459	0.0271	0.3912	0.1905	0.1497	0.1016
RAMOS-12	-0.1165	-0.2172	0.1041	0.0764	0.0218	-0.0312	0.0396	-0.0579	0.1604	0.1207
RAMOS-13	-0.0964	-0.0352	-0.1482	-0.4105	0.0671	0.0873	0.0628	-0.1078	-0.1313	0.2225
RAMOS-14	0.0770	0.0439	0.1992	0.1755	0.1871	0.0596	0.1122	0.1342	-0.0071	0.5467
RAMOS-15	-0.0651	0.0051	0.0824	0.1523	0.5490	0.2242	0.3339	0.1534	0.1197	-0.1728
RAMOS-16	0.1476	-0.0229	-0.0943	0.0648	0.1286	0.3852	-0.1529	-0.1393	-0.1420	-0.1365
RAMOS-17	0.0138	-0.1249	0.1032	0.0471	0.1509	-0.0441	0.1530	0.2156	-0.0419	0.2965
RAMOS-18	-0.1160	-0.1034	0.0134	-0.0843	0.0445	0.2405	-0.1063	-0.1298	-0.1514	-0.0920
RAMOS-19	0.1792	-0.0083	-0.0562	0.2649	-0.0647	-0.2234	0.1370	-0.0944	0.1987	-0.0835
RAMOS-20	-0.0779	-0.4204	0.0651	0.1934	0.1729	-0.0420	0.2384	0.0432	-0.0311	0.0049

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Grade 5 Reading (continued)

	WD----31	WD----32	WD----33	WD----34	RAMOS--1	RAMOS--2	RAMOS--3	RAMOS--4	RAMOS--5	RAMOS--6
APPLE--1	-0.1330	-0.1379	-0.1020	-0.0331	0.0545	-0.0294	0.1451	-0.0796	-0.0767	-0.1357
APPLE--2	-0.0675	-0.0189	-0.1664	0.2689	0.1205	0.0055	0.0752	0.2388	-0.1076	0.0667
APPLE--3	0.0657	-0.2472	0.0424	0.1358	0.0506	0.0267	0.0281	0.0185	-0.0083	0.1279
APPLE--4	0.1758	0.0647	-0.1638	-0.2723	-0.0725	-0.0157	-0.0471	-0.0709	0.0130	-0.0885
APPLE--5	0.1303	-0.1878	0.0500	0.1227	-0.1490	-0.0249	-0.0950	-0.1924	0.0600	-0.0521
APPLE--6	0.1881	-0.3244	0.0038	0.2772	0.1218	0.2071	-0.1636	0.3420	-0.1369	0.0450
APPLE--7	-0.0165	0.1453	0.1409	-0.0186	-0.0820	-0.0898	0.0527	-0.1174	-0.0542	0.4305
APPLE--8	-0.1924	-0.0327	-0.1307	-0.1475	0.0592	-0.1100	-0.0836	0.6642	0.0677	0.0522
APPLE--9	0.0134	-0.0656	-0.0595	0.0690	0.1276	0.0712	-0.1088	0.3222	0.2646	0.1288
APPLE-10	-0.1100	0.1536	-0.2352	-0.1280	0.0681	0.2005	-0.1316	0.1113	-0.1460	-0.1216
APPLE-11	-0.0488	-0.1328	0.0895	-0.1154	0.1054	-0.0445	0.2362	-0.0588	-0.1662	0.2366
APPLE-12	0.1365	0.3894	0.1811	0.0012	-0.1596	-0.0710	-0.0858	-0.0486	-0.0545	-0.1778
APPLE-13	0.0935	0.1792	-0.2405	0.0702	-0.1503	-0.0860	-0.1095	-0.1563	0.3106	-0.1502
APPLE-14	0.0394	0.0646	0.2071	-0.0880	-0.2152	-0.1098	-0.1335	-0.1370	0.1640	-0.2270
APPLE-15	-0.1914	-0.0959	-0.1657	-0.0163	0.0429	0.2578	-0.1391	-0.0580	-0.2176	-0.0363
APPLE-16	0.0057	0.0984	-0.0468	0.3125	0.3277	0.3927	-0.0341	0.0079	0.0702	-0.1358
APPLE-17	0.1449	-0.1780	0.0140	-0.0802	-0.0845	0.1516	-0.1584	-0.2006	-0.0959	0.0791
APPLE-19	-0.0597	0.0629	-0.0737	-0.1412	0.0860	-0.0812	0.1134	0.0913	0.1565	0.2382
APPLE-20	0.2596	0.1985	-0.1168	-0.2606	-0.1936	0.1043	-0.3301	0.0031	-0.0448	-0.2311
APPLE-21	-0.1180	0.1091	-0.0905	-0.0463	-0.2030	-0.2271	0.0075	-0.0305	-0.0175	-0.1486
APPLE-22	-0.1716	-0.0066	-0.2107	0.2200	-0.0653	-0.3148	0.2315	0.0182	0.0370	-0.0877
APPLE-23	0.0119	-0.3573	-0.0747	0.1838	0.0826	0.3990	-0.2523	-0.0576	-0.1599	-0.0337
APPLE-24	-0.1018	0.0762	-0.1929	-0.0647	0.1679	0.0278	0.1687	0.0243	-0.0217	0.0312
APPLE-25	0.0146	0.1286	0.1607	-0.0869	0.2868	0.1761	0.0262	0.3401	0.0260	0.1804
APPLE-26	0.0701	-0.1333	-0.0160	0.0308	-0.0110	0.2448	-0.2171	-0.0548	-0.1153	-0.0506
APPLE-27	-0.1339	0.1010	-0.0250	-0.0027	-0.2008	-0.2912	0.1066	-0.0725	-0.0742	0.1079
APPLE-28	-0.1014	0.1379	-0.0357	0.0204	-0.0098	-0.0044	-0.0434	0.0158	0.1210	-0.1433
APPLE-29	-0.1682	-0.1885	-0.0557	-0.2869	-0.0848	-0.0054	0.0260	-0.1835	-0.2108	0.0584
APPLE-30	0.0798	-0.0049	0.1264	0.1626	-0.0326	-0.0726	-0.0006	-0.0531	0.2277	0.0668

Grade 5 Reading (continued)

	WD----31	WD----32	WD----33	WD----34	RAMOS--1	RAMOS--2	RAMOS--3	RAMOS--4	RAMOS--5	RAMOS--6
APPLE-31	-0.1544	0.1036	-0.1871	0.2414	0.0175	-0.0527	0.0281	0.1559	-0.0465	-0.0471
APPLE-32	-0.0648	0.0312	-0.0718	-0.1031	0.0750	-0.1236	0.1707	0.1685	-0.0672	-0.0421
APPLE-33	-0.0905	-0.3408	0.0610	0.0996	0.1515	-0.2306	0.3348	0.1945	0.0478	0.0705
APPLE-34	-0.0358	-0.2309	0.0846	0.1186	0.0982	0.1090	-0.0498	0.0087	0.2061	0.0555
APPLE-35	-0.0476	0.1192	-0.2355	0.0057	0.0007	-0.1201	0.1769	-0.0746	-0.0946	-0.0658
APPLE-36	-0.0592	-0.0079	-0.0688	0.1794	0.1641	0.2606	-0.1099	0.0701	0.0412	0.0644
APPLE-37	0.0376	-0.0448	-0.0651	0.0566	0.1824	0.1216	0.0859	-0.0869	0.1595	-0.1363
APPLE-38	0.1582	0.2003	-0.1483	-0.1758	-0.1492	0.2689	-0.3982	-0.0495	-0.1614	-0.2263
APPLE-39	-0.0767	-0.1595	0.0110	0.1929	-0.1290	-0.0918	-0.1077	-0.0028	0.1966	-0.1564
APPLE-40	-0.1184	0.1462	-0.2776	-0.0070	0.1932	0.3498	-0.0717	-0.1024	-0.0797	-0.2075
APPLE-41	-0.0724	-0.0307	0.0767	0.1275	-0.0377	0.1043	-0.1115	-0.0446	-0.0993	0.1559
APPLE-42	0.1666	-0.1859	0.0047	0.1534	0.0254	0.0794	-0.0569	0.0640	-0.0766	-0.0850
APPLE-43	0.2432	-0.0191	-0.0741	0.1678	0.1516	0.2180	-0.0078	-0.0791	-0.0245	-0.1112
APPLE-44	0.3348	-0.0190	-0.0128	-0.0026	-0.1544	-0.1417	-0.1009	-0.0968	0.3970	-0.0651
APPLE-45	-0.0196	0.0880	-0.1058	-0.2554	-0.0935	-0.0430	-0.1918	0.2549	0.1111	0.2204
APPLE-46	-0.1568	-0.0111	-0.1118	0.3119	0.0811	0.0691	0.0590	-0.0465	-0.0629	-0.0813
APPLE-47	-0.0242	0.0605	-0.0467	0.1079	-0.0088	0.1689	-0.0826	-0.1096	-0.2457	-0.0924
APPLE-48	0.0409	0.0555	-0.0815	-0.2458	-0.0795	0.0736	-0.1412	-0.0578	-0.0339	-0.1173
APPLE-49	-0.0904	-0.2923	0.0556	0.0369	-0.1970	-0.1516	-0.0461	-0.0937	0.0091	0.1780
APPLE-50	0.1233	0.0585	-0.1199	0.1393	-0.0082	-0.0805	-0.0190	0.0428	0.3057	-0.0430
CATRC-GN	0.0149	0.0544	-0.0798	0.0609	-0.1162	-0.0824	0.1272	-0.2971	-0.2853	0.0616
RAPPL-GN	0.1083	0.1351	0.0798	-0.1565	-0.0593	-0.0679	0.0724	-0.0542	-0.2153	-0.1804
CECOC-GN	0.2546	0.2285	0.0993	-0.2747	0.0793	0.2869	-0.1659	-0.0868	0.0011	-0.1948
RACH.-GN	-0.1412	0.2015	-0.3660	-0.1114	0.0666	0.1378	-0.0465	0.1187	-0.2408	-0.0019
TOTRO-GN	0.0027	0.2279	-0.0976	-0.1203	0.0058	-0.0088	0.1277	-0.0878	-0.3224	-0.0522

Grade 5 Reading (continued)

	RAMOS--7	RAMOS--8	RAMOS--9	RAMOS-10	RAMOS-11	RAMOS-12	RAMOS-13	RAMOS-14	RAMOS-15	RAMOS-16
WC-----1	0.1616	0.0014	-0.0366	0.0287	0.1461	0.0902	-0.1606	-0.1085	0.0681	-0.0985
WC-----2	0.0512	0.0474	0.0089	-0.0478	0.0858	0.0643	-0.0923	0.1406	-0.0312	0.0369
WC-----3	0.4440	-0.0671	0.2596	0.1172	0.3390	0.0130	-0.0703	-0.1155	0.3793	-0.0566
WC-----4	0.4623	-0.0572	0.2908	-0.2180	0.1597	-0.2250	-0.1208	-0.2111	0.4154	0.1950
WC-----5	0.0454	-0.2184	0.0330	-0.2429	0.0685	-0.1906	-0.2102	0.1892	0.0137	0.0200
WD-----6	0.1244	-0.2321	0.0867	-0.0781	-0.0191	0.2309	-0.0075	0.0452	-0.0136	0.0988
WD-----7	-0.0706	-0.1374	-0.2195	0.1403	-0.0273	0.0080	-0.1209	-0.1091	-0.1300	-0.1267
WC-----8	-0.0277	-0.1985	-0.0247	0.0228	0.1311	-0.0669	-0.1492	-0.0050	-0.0473	0.1114
WD-----9	0.2155	-0.0758	-0.1087	0.1504	0.0839	0.1830	0.1487	-0.1094	-0.0477	-0.0866
WD----10	0.2402	0.0192	0.0948	0.1502	0.0112	0.1206	0.1236	0.0350	0.0437	0.0716
WC----11	-0.0056	0.0350	-0.1977	0.1682	0.0247	0.2272	0.1724	0.1120	-0.3091	-0.0925
WC----12	0.1371	-0.0232	-0.1045	0.0425	-0.0371	0.2139	0.1381	-0.0542	-0.2090	0.0491
WD----13	-0.1141	0.1288	0.0385	-0.1464	0.0202	-0.0303	0.1617	-0.1741	0.0384	0.0659
WC----14	-0.1273	0.1085	0.1530	-0.0862	0.1825	-0.0311	0.1552	0.0756	0.0489	0.0481
WD----15	0.0491	0.0198	-0.0060	-0.0307	-0.0977	-0.0590	0.3274	-0.0572	-0.0093	-0.0553
WD----16	-0.0181	0.0780	-0.0189	-0.0727	0.0305	-0.0359	0.1749	-0.1453	0.0854	-0.0816
WD----17	0.0307	-0.1123	-0.1771	0.0597	-0.1655	0.0321	-0.1579	-0.0479	-0.1169	-0.1324
WC----18	0.0302	-0.1573	-0.0688	-0.1161	-0.1072	0.0144	-0.1355	0.0309	-0.0932	-0.0698
WC----19	0.0090	-0.1075	-0.1175	-0.0109	-0.1242	0.0587	-0.1468	0.0371	-0.2021	-0.1025
WC----20	-0.1196	0.0682	-0.1069	0.1915	0.0088	0.0202	-0.1187	-0.1116	-0.0866	0.1458
WD----21	0.0843	-0.0099	-0.3068	0.2249	-0.1454	0.1694	0.2778	0.0287	-0.3529	-0.0159
WD----22	0.0467	0.1832	-0.1668	0.1949	-0.0060	0.1775	0.1999	0.0291	-0.2419	0.1176
WD----23	-0.2021	0.2912	-0.0573	0.1157	-0.2232	0.1353	-0.0123	-0.0726	-0.0139	0.0055
WC----24	0.0344	-0.1003	0.1053	-0.0745	0.0247	0.0341	0.0625	0.2376	-0.0811	-0.1113
WC----25	0.1874	-0.0070	0.1832	-0.0045	0.0629	-0.0741	-0.1798	-0.0185	0.1408	0.3493
WD----26	0.0819	-0.1753	0.0423	-0.1662	-0.0008	-0.0974	-0.0804	-0.1852	0.1628	0.0150
WD----27	-0.0281	0.1543	-0.0441	0.3246	-0.2629	-0.0983	0.2408	-0.1038	-0.2498	0.1797
WC----28	-0.1402	-0.0090	-0.1064	0.0910	-0.0335	0.0081	-0.1229	-0.0022	-0.1608	0.1234
WD----29	-0.1853	0.0884	-0.0748	0.1170	-0.1063	-0.0344	-0.1474	-0.0288	-0.1728	0.0523
WC----30	-0.0645	0.1964	0.0570	0.1511	0.0869	0.0798	-0.0475	0.0765	-0.1164	0.1686
WC----31	-0.0337	-0.0136	-0.0727	0.1712	0.1020	-0.1165	-0.0964	0.0770	-0.0651	0.1476
WC----32	0.2407	-0.4125	0.0033	-0.2351	-0.0932	-0.2172	-0.0352	0.0439	0.0051	-0.0229
WD----33	-0.1058	0.0062	0.0939	0.0705	0.0372	0.1041	-0.1482	0.1992	0.0824	-0.0943
WC----34	0.1502	-0.0061	0.1860	-0.0318	0.1523	0.0764	-0.4105	0.1755	0.1523	0.0648

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Grade 5 Reading (continued)

	RAMOS--7	RAMOS--8	RAMOS--9	RAMOS-10	RAMOS-11	RAMOS-12	RAMOS-13	RAMOS-14	RAMOS-15	RAMOS-16
RAMOS--1	0.4496	0.1717	0.6863	0.4182	0.4459	0.0218	0.0671	0.1871	0.5490	0.1286
RAMOS--2	0.3413	-0.0330	0.2915	0.3185	0.0271	-0.0312	0.0873	0.0596	0.2247	0.3852
RAMOS--3	0.1262	0.2708	0.4773	0.0338	0.3912	0.0396	0.0628	0.1122	0.3339	-0.1529
RAMOS--4	0.0070	0.0001	0.1204	0.2328	0.1905	-0.0579	-0.1078	0.1342	0.1534	-0.1393
RAMOS--5	0.2250	-0.1412	-0.0329	0.2022	0.1497	0.1604	-0.1313	-0.0071	0.1197	-0.1420
RAMOS--6	-0.3287	-0.0261	0.2502	0.1456	0.1016	0.1207	0.2225	0.5467	-0.1728	-0.1365
RAMOS--7	1.0000	-0.1455	0.5170	0.1132	0.3028	0.0124	0.1076	-0.1422	0.6123	0.1487
RAMOS--8	-0.1455	1.0000	0.0677	0.3058	0.2305	-0.0264	0.0384	-0.0074	-0.0120	0.0422
RAMOS--9	0.5170	0.0677	1.0000	0.0218	0.5224	0.0286	0.0690	0.2205	0.7037	0.1725
RAMOS-10	0.1132	0.3058	0.0218	1.0000	0.1637	0.1051	0.4088	0.1519	-0.0723	0.1617
RAMOS-11	0.3028	0.2305	0.5224	0.1637	1.0000	-0.1223	-0.0253	0.2469	0.4925	0.0236
RAMOS-12	0.0124	-0.0264	0.0286	0.1051	-0.1223	1.0000	0.1454	0.0440	-0.0648	-0.1357
RAMOS-13	0.1076	0.0384	0.0690	0.4088	-0.0253	0.1454	1.0000	-0.0563	-0.2448	0.1630
RAMOS-14	-0.1422	-0.0074	0.2205	0.1519	0.2469	0.0440	-0.0563	1.0000	-0.2017	-0.0661
RAMOS-15	0.6123	-0.0120	0.7037	-0.0723	0.4925	-0.0648	-0.2448	-0.2017	1.0000	-0.0760
RAMOS-16	0.1487	0.0422	0.1725	0.1617	0.0236	-0.1357	0.1630	-0.0661	-0.0760	1.0000
RAMOS-17	-0.1074	0.3668	0.1597	0.1712	-0.0751	0.2141	-0.0877	0.0598	-0.0490	-0.0862
RAMOS-18	-0.0857	0.1907	-0.1195	0.1296	-0.1806	-0.0926	-0.0678	-0.1555	-0.0736	-0.0646
RAMOS-19	-0.0595	-0.0104	-0.1387	0.1565	-0.0718	-0.0145	-0.0601	-0.1124	-0.1876	-0.0128
RAMOS-20	-0.0486	0.2909	0.0650	0.1286	0.0504	-0.0791	0.0100	-0.0884	0.0267	0.0016

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Grade 5 Reading (continued)

	RAMOS--7	RAMOS--8	RAMOS--9	RAMOS-10	RAMOS-11	RAMOS-12	RAMOS-13	RAMOS-14	RAMOS-15	RAMOS-16
APPLE--1	-0.1359	-0.0088	0.0653	-0.0299	-0.1216	0.2229	-0.1417	-0.1007	0.1088	-0.0168
APPLE--2	-0.2282	0.1037	-0.0471	-0.0303	-0.0334	0.0797	-0.1633	0.2947	-0.2008	-0.0888
APPLE--3	-0.1239	0.0816	0.0295	0.2695	0.0820	0.1005	0.1369	-0.0079	-0.1018	0.0374
APPLE--4	-0.0356	-0.0047	-0.1368	0.0579	0.1759	-0.1744	0.0309	-0.1676	0.0735	-0.1970
APPLE--5	-0.0801	0.0443	-0.0817	-0.0021	0.0798	-0.0006	0.0620	0.0129	-0.1298	-0.0796
APPLE--6	-0.1176	0.3112	0.1129	0.2468	0.2691	-0.0591	-0.0382	0.2942	-0.0845	0.1015
APPLE--7	-0.1546	-0.1585	0.1310	-0.1585	-0.1646	0.0715	0.1293	0.2165	-0.0617	-0.0933
APPLE--8	-0.0215	-0.0226	-0.0051	0.0458	0.0296	0.0132	0.2293	-0.0746	0.0058	0.0256
APPLE--9	-0.0313	-0.1111	0.0187	0.1433	0.0535	0.0666	-0.1186	0.1403	0.0271	0.0926
APPLE-10	0.1718	-0.0656	-0.0795	0.1170	-0.1886	0.0396	0.2175	-0.0884	-0.0573	0.1534
APPLE-11	-0.1054	0.2462	0.1529	-0.0542	0.1163	-0.1471	0.0629	0.1658	0.0307	-0.0758
APPLE-12	0.2518	-0.0910	-0.0438	-0.1011	-0.1684	-0.1978	-0.0501	-0.0504	0.0292	-0.0902
APPLE-13	-0.1441	0.0054	-0.3062	-0.1180	-0.1201	-0.0374	-0.0140	-0.1474	-0.1981	-0.0487
APPLE-14	0.1129	0.0818	-0.1998	-0.0431	-0.0597	0.0407	-0.0375	-0.1626	0.0040	-0.1154
APPLE-15	-0.0829	-0.0278	0.0102	-0.2324	-0.1624	-0.1457	-0.0403	-0.1547	-0.1328	0.1873
APPLE-16	0.3994	0.0635	0.2009	0.2282	-0.0550	0.0353	-0.1155	0.1372	0.1694	0.2363
APPLE-17	-0.1550	0.2445	0.0560	-0.0799	0.0627	0.0130	-0.0118	-0.0786	-0.0735	0.1516
APPLE-19	-0.0984	-0.2902	0.0168	0.1810	0.0297	-0.0460	0.2565	0.0175	0.0763	-0.1982
APPLE-20	0.0129	0.1593	-0.2219	-0.0641	-0.1104	-0.1239	-0.0101	-0.1083	-0.2380	0.1439
APPLE-21	0.0564	-0.1149	-0.1791	-0.1571	-0.1056	-0.1283	-0.0895	-0.1317	-0.0058	-0.0716
APPLE-22	-0.1166	-0.0338	-0.0131	-0.0894	-0.0035	0.1057	-0.0833	0.0566	-0.0930	-0.0941
APPLE-23	-0.0079	0.4025	0.0703	0.0225	0.1509	-0.0825	-0.1415	0.0825	-0.0228	0.1834
APPLE-24	0.2673	-0.1527	0.1958	0.1293	0.0950	-0.0778	0.4649	-0.2235	0.0064	0.1090
APPLE-25	-0.0853	-0.0843	0.0109	0.2153	0.2280	-0.1289	-0.0973	0.0864	0.0845	-0.1383
APPLE-26	-0.0278	0.2543	-0.0347	0.0490	-0.0138	0.1401	-0.1449	0.1007	-0.1627	0.1006
APPLE-27	-0.1844	-0.1798	-0.0791	-0.1653	-0.1512	-0.1064	-0.1154	0.0690	0.0186	-0.1695
APPLE-28	0.2033	-0.0130	-0.0164	0.1674	-0.0013	-0.0326	-0.0788	0.0694	0.1182	0.0169
APPLE-29	-0.2336	-0.1318	-0.0731	-0.0978	-0.2737	-0.0998	0.3101	-0.1001	-0.1296	-0.0992
APPLE-30	0.0275	-0.1298	-0.1241	0.0135	-0.1635	0.3475	0.0047	-0.1411	0.0041	-0.1128

Grade 5 Reading (continued)

	RAMOS--7	RAMOS--8	RAMOS--9	RAMOS-10	RAMOS-11	RAMOS-12	RAMOS-13	RAMOS-14	RAMOS-15	RAMOS-16
APPLE-31	-0.1067	-0.0109	-0.1326	-0.1321	-0.0351	-0.0373	-0.1026	0.1839	-0.2116	-0.0692
APPLE-32	-0.0298	0.4488	-0.0177	0.0843	0.1061	-0.1108	-0.0307	0.1376	0.0261	-0.1031
APPLE-33	0.1234	0.0567	0.2880	-0.0189	0.2957	0.0373	-0.0328	-0.0598	0.3047	-0.0306
APPLE-34	0.0634	-0.0073	0.2137	0.1612	0.1393	0.1088	-0.0985	0.1303	0.2908	-0.1528
APPLE-35	0.0213	0.0388	0.1563	-0.1467	0.1406	-0.0373	0.1135	-0.1307	0.0791	-0.0186
APPLE-36	0.0320	0.0882	0.2229	0.1170	0.2505	-0.0925	-0.0537	-0.0541	0.1865	0.0474
APPLE-37	0.1874	0.0864	0.0997	0.1378	0.0286	-0.0494	-0.0755	-0.0660	0.2366	-0.0886
APPLE-38	0.1671	0.0236	-0.1186	-0.0792	-0.1182	-0.0249	0.1009	-0.0571	-0.2253	0.2873
APPLE-39	0.1011	-0.1312	-0.0299	-0.1116	0.0559	-0.1132	-0.0802	-0.0766	0.1948	-0.1842
APPLE-40	0.3252	-0.2062	0.2229	-0.1511	-0.1448	-0.1314	-0.0135	-0.1931	0.3171	0.2258
APPLE-41	0.0924	-0.1289	0.1390	-0.1608	-0.0409	0.2225	-0.1044	0.0937	0.0718	0.2422
APPLE-42	0.0120	0.1039	0.0307	0.1052	0.0448	-0.0695	-0.1140	0.1532	-0.0789	0.1762
APPLE-43	0.1615	0.2429	0.2678	0.0640	0.3169	-0.0647	0.0174	0.1918	0.0931	0.1449
APPLE-44	-0.1838	0.0520	-0.1294	-0.0447	0.0020	-0.0277	-0.0417	-0.0246	-0.1037	-0.0892
APPLE-45	-0.2263	0.1532	-0.1393	0.1347	-0.1530	0.0283	0.2282	0.1113	-0.2889	-0.0523
APPLE-46	0.0668	0.0860	0.0999	-0.0921	-0.1264	0.0543	-0.1621	-0.2099	-0.0436	0.1763
APPLE-47	0.0086	0.1310	-0.0515	-0.0235	-0.0501	-0.0925	-0.1108	0.1352	-0.0853	0.0936
APPLE-48	0.0799	0.0228	0.0270	0.0528	0.1248	0.1262	-0.0239	-0.0829	0.1153	0.1082
APPLE-49	-0.0528	0.1119	-0.0481	-0.1134	0.0895	0.1750	0.0653	0.0474	0.0078	-0.2809
APPLE-50	0.0125	-0.0556	-0.0058	-0.0162	-0.1397	0.1408	0.0453	0.0016	-0.0255	-0.0028
CATRC-GN	-0.1788	0.1087	-0.0187	-0.1650	-0.1121	0.0070	0.0092	0.1169	-0.1848	0.0268
RAPP[illegible]-GN	-0.1422	0.1958	-0.2160	-0.1311	-0.1138	-0.2800	-0.2847	0.0699	-0.0338	-0.1321
DECOD-GN	0.0430	0.0428	-0.2265	0.0018	-0.0690	-0.3514	-0.0024	-0.2518	-0.0453	0.0817
RACH.-GN	-0.2572	-0.1088	-0.0769	0.0129	-0.1273	-0.0272	0.0348	0.0333	-0.0486	-0.0959
TOTRC-GN	-0.2393	0.0926	-0.1163	-0.1302	-0.1374	-0.1676	-0.1986	0.1412	-0.0447	-0.1548

Grade 5 Reading (continued)

	RAMOS-17	RAMOS-18	RAMOS-19	RAMOS-20	APPLE--1	APPLE--2	APPLE--3	APPLE--4	APPLE--5	APPLE--6
WC-----1	0.1042	-0.0103	0.0915	-0.0361	-0.1833	-0.1245	-0.0870	0.5224	-0.1551	-0.0665
WC-----2	-0.0930	0.0329	-0.1302	-0.1268	-0.1928	0.1781	-0.0492	0.2462	-0.0441	0.1257
WC-----3	0.0869	0.0638	-0.1673	0.0713	-0.0547	-0.0265	-0.0724	0.2533	-0.0937	0.0616
WD-----4	-0.1109	-0.0691	-0.1589	0.0677	-0.2127	-0.2205	-0.2185	0.4285	-0.0456	-0.1740
WD-----5	-0.1736	-0.0811	-0.1685	-0.1376	-0.2303	-0.0582	-0.0369	0.1767	0.0301	0.1091
WD-----6	-0.1177	-0.0053	0.0719	-0.1593	-0.0632	-0.0476	0.0446	0.2143	0.1349	0.0314
WD-----7	0.0734	-0.1022	0.4369	-0.0687	-0.1150	-0.0766	0.1887	0.4429	0.0188	-0.0410
WD-----8	0.0030	-0.0908	0.3142	-0.0809	0.0369	0.0581	0.2104	0.2719	0.1463	0.2575
WD-----9	-0.0878	0.0867	0.1206	-0.0778	0.0287	0.0252	0.1099	0.2346	0.1684	-0.0413
WD----10	-0.0361	-0.0840	0.1911	0.1345	-0.0393	0.1842	-0.0790	0.0269	-0.0563	-0.0248
WD----11	0.1119	-0.0888	0.1870	-0.1677	-0.0399	0.0599	0.1817	0.1130	0.2094	0.0053
WD----12	0.0238	0.0534	0.2131	-0.0771	0.0025	0.1192	0.1011	0.0506	0.2196	-0.0328
WD----13	0.0036	-0.1627	-0.0408	-0.0775	-0.0405	-0.2891	0.1989	-0.0883	0.2404	0.0376
WD----14	-0.0815	-0.1890	-0.0884	-0.0384	0.0794	-0.1418	0.0904	-0.0083	0.0218	0.0237
WD----15	-0.1540	-0.1346	-0.0262	0.0000	-0.0655	-0.1234	0.1708	-0.0508	0.3069	0.0139
WD----16	-0.1517	0.0295	-0.0979	-0.0481	0.1042	-0.1642	0.1509	0.0741	0.3225	-0.0566
WD----17	-0.0508	0.1624	0.4383	-0.0838	-0.0393	0.0430	0.2473	0.2809	0.1861	0.0389
WD----18	0.0413	-0.1070	0.2872	-0.0719	-0.0624	0.0589	0.1646	0.1118	0.2164	0.0146
WD----19	0.2044	-0.1160	0.4779	-0.0779	-0.0690	0.0688	0.2305	0.0914	0.1631	0.1020
WD----20	0.0276	0.1542	0.3579	-0.0882	-0.0371	0.0861	0.3391	0.2862	0.1541	0.2224
WD----21	-0.1731	-0.0559	0.2599	-0.0286	-0.0770	0.1506	0.1605	-0.1323	0.3419	0.0276
WD----22	-0.0231	-0.0321	0.1174	-0.0538	0.0653	0.1788	0.1662	0.0669	0.1439	0.0923
WD----23	0.4588	0.0045	-0.1077	-0.0702	0.3206	-0.1160	0.0740	-0.1522	-0.1749	0.0352
WD----24	-0.1448	0.2143	-0.1656	0.1438	-0.2717	0.1356	-0.1285	-0.2191	-0.0280	-0.0130
WD----25	0.0386	-0.1419	0.1170	-0.0953	0.0897	0.0384	0.2003	-0.1416	0.1276	0.1518
WC----26	-0.1885	-0.0049	-0.0192	-0.1252	0.2200	-0.1091	-0.1276	0.3465	-0.1886	-0.1145
WC----27	0.2246	0.4895	0.2310	-0.0830	0.0440	-0.0686	0.2188	-0.0252	0.0619	-0.0065
WC----28	0.0632	-0.1333	0.4046	-0.0895	-0.1171	0.0711	0.2408	0.1697	0.2046	0.1697
WD----29	0.1596	0.1052	0.3494	-0.1008	-0.0941	0.0651	0.2514	0.1706	0.1966	0.1697
WC----30	0.2724	-0.0878	0.2865	-0.0590	-0.0367	0.1886	0.3907	0.0480	0.2293	0.2559
WC----31	0.0138	-0.1160	0.1792	-0.0779	-0.1330	-0.0675	0.0657	0.1758	0.1303	0.1881
WD----32	-0.1249	-0.1034	-0.0083	-0.4204	-0.1379	-0.0189	-0.2472	0.0647	-0.1878	-0.3244
WD----33	0.1032	0.0134	-0.0562	0.0651	-0.1020	-0.1664	0.0424	-0.1638	0.0500	0.0038
WC----34	0.0471	-0.0843	0.2649	0.1934	-0.0331	0.2689	0.1358	-0.2723	0.1227	0.2772

Grade 5 Reading (continued)

	RAMOS-17	RAMOS-18	RAMOS-19	RAMOS-20	APPLE--1	APPLE--2	APPLE--3	APPLE--4	APPLE--5	APPLE--6
RAMOS--1	0.1509	0.0445	-0.0647	0.1729	0.0545	0.1205	0.0506	-0.0725	-0.1490	0.1218
RAMOS--2	-0.0441	0.2405	-0.2234	-0.0420	-0.0294	0.0055	0.0267	-0.0157	-0.0249	0.2071
RAMOS--3	0.1530	-0.1063	0.1370	0.2384	0.1451	0.0752	0.0281	-0.0471	-0.0950	-0.1636
RAMOS--4	0.2156	-0.1298	-0.0944	0.0432	-0.0796	0.2388	0.0185	-0.0709	-0.1924	0.3420
RAMOS--5	-0.0419	-0.1514	0.1987	-0.0311	-0.0767	-0.1076	-0.0083	0.0130	0.0600	-0.1369
RAMOS--6	0.2965	-0.0920	-0.0835	0.0049	-0.1357	0.0667	0.1279	-0.0885	-0.0521	0.0450
RAMOS--7	-0.1074	-0.0857	-0.0595	-0.0486	-0.1359	-0.2282	-0.1239	-0.0356	-0.0801	-0.1176
RAMOS--8	0.3668	0.1907	-0.0104	0.2909	-0.0088	0.1037	0.0816	-0.0047	0.0443	0.3112
RAMOS--9	0.1597	-0.1195	-0.1387	0.0650	0.0653	-0.0471	0.0295	-0.1368	-0.0817	0.1129
RAMOS-10	0.1712	0.1296	0.1565	0.1286	-0.0299	-0.0303	0.2695	0.0579	-0.0021	0.2468
RAMOS-11	-0.0751	-0.1806	-0.0718	0.0504	-0.1216	-0.0334	0.0820	0.1759	0.0798	0.2691
RAMOS-12	0.2141	-0.0926	-0.0145	-0.0791	0.2229	0.0797	0.1005	-0.1744	-0.0006	-0.0591
RAMOS-13	-0.0877	-0.0678	-0.0601	0.0100	-0.1417	-0.1633	0.1369	0.0309	0.0620	-0.0382
RAMOS-14	0.0598	-0.1555	-0.1124	-0.0884	-0.1007	0.2947	-0.0079	-0.1676	0.0129	0.2942
RAMOS-15	-0.0490	-0.0736	-0.1876	0.0267	0.1088	-0.2008	-0.1018	0.0735	-0.1298	-0.0845
RAMOS-16	-0.0862	-0.0646	-0.0128	0.0016	-0.0168	-0.0888	0.0374	-0.1970	-0.0796	0.1015
RAMOS-17	1.0000	-0.1642	-0.0913	-0.0037	0.1541	0.0479	0.0558	-0.1757	-0.1454	0.3302
RAMOS-18	-0.1642	1.0000	0.0681	0.2717	0.0947	-0.0190	-0.0073	0.2246	-0.0173	-0.1115
RAMOS-19	-0.0913	0.0681	1.0000	0.3651	-0.0389	0.0031	0.4667	0.0727	0.2479	-0.1784
RAMOS-20	-0.0037	0.2717	0.3651	1.0000	-0.0518	-0.0200	-0.1036	0.0078	-0.0854	-0.1163

Grade 5 Reading (continued)

	RAMOS-17	RAMOS-18	RAMOS-19	RAMOS-20	APPLE--1	APPLE--2	APPLE--3	APPLE--4	APPLE--5	APPLE--6
APPLE--1	0.1541	0.0947	-0.0389	-0.0518	1.0000	-0.0465	0.0426	-0.1813	-0.0583	0.0884
APPLE--2	0.0479	-0.0190	0.0031	-0.0200	-0.0465	1.0000	-0.0314	-0.1887	-0.0792	0.2127
APPLE--3	0.0558	-0.0073	0.4667	-0.1036	0.0426	-0.0314	1.0000	-0.1138	0.6747	0.3044
APPLE--4	-0.1757	0.2246	0.0727	0.0078	-0.1813	-0.1887	-0.1138	1.0000	-0.1843	-0.2025
APPLE--5	-0.1454	-0.0173	0.2479	-0.0854	-0.0583	-0.0792	0.6747	-0.1843	1.0000	0.2361
APPLE--6	0.3302	-0.1115	-0.1784	-0.1163	0.0884	0.2127	0.3044	-0.2025	0.2361	1.0000
APPLE--7	0.1081	-0.1314	-0.1986	-0.1231	0.1115	-0.2326	-0.0531	-0.0963	-0.0851	-0.1221
APPLE--8	-0.0385	-0.1534	-0.1464	0.0602	-0.1631	0.0756	-0.0655	0.0326	-0.1713	0.0390
APPLE--9	0.1117	-0.0782	-0.0458	0.2447	0.0308	-0.0397	-0.0628	-0.1714	-0.0397	0.0953
APPLE-10	-0.0213	-0.0144	-0.0888	0.1326	-0.1539	0.0003	-0.1867	0.0993	-0.1166	-0.1919
APPLE-11	0.1149	-0.0121	-0.0217	0.3933	-0.1947	-0.1479	-0.2633	0.1623	-0.1875	-0.0756
APPLE-12	-0.0854	0.0205	0.0607	0.0291	-0.1034	-0.0973	-0.2063	-0.2046	-0.1210	-0.1487
APPLE-13	-0.1266	0.0313	-0.0405	-0.1127	-0.1350	0.0673	-0.2185	0.0348	0.0747	-0.1358
APPLE-14	-0.1539	0.0401	-0.0530	0.0992	-0.1309	-0.1743	-0.3128	-0.1102	-0.1074	-0.2821
APPLE-15	0.1004	-0.0157	0.1473	-0.1049	-0.0167	0.1485	0.2271	-0.1083	0.1580	0.1577
APPLE-16	-0.0501	0.1119	-0.0029	-0.0673	0.1515	-0.0752	-0.0835	-0.2318	-0.0296	-0.0366
APPLE-17	0.2879	-0.0782	-0.0767	-0.1002	-0.0316	-0.0769	-0.0551	-0.0337	-0.2247	0.1966
APPLE-19	-0.1243	-0.1719	0.1302	-0.0604	-0.0648	-0.2731	0.0285	0.5048	-0.0717	-0.2059
APPLE-20	-0.0703	0.2733	-0.0809	0.1500	-0.1624	0.1032	-0.3118	0.2391	-0.1597	-0.1138
APPLE-21	-0.1361	-0.0286	-0.0942	-0.0614	-0.0779	-0.1979	-0.1430	-0.1343	-0.1177	-0.0917
APPLE-22	0.1079	-0.1813	0.3072	-0.0732	0.3277	0.1929	0.2077	-0.3004	0.3385	0.0153
APPLE-23	0.0591	0.1961	-0.1796	0.0734	-0.0346	0.3024	0.1000	-0.2436	0.1106	0.4726
APPLE-24	-0.1023	0.0788	0.3308	0.0359	-0.0687	-0.1302	0.2989	0.1356	0.1557	-0.2268
APPLE-25	0.0447	0.0837	-0.0946	-0.0617	-0.0617	-0.0543	-0.0234	0.1417	-0.1400	0.0494
APPLE-26	0.4945	0.0693	-0.1854	-0.1452	0.1818	0.1406	0.0693	-0.1721	0.1163	0.4966
APPLE-27	-0.0841	-0.0869	-0.0954	-0.0680	0.0371	-0.1878	-0.1543	0.1306	-0.1474	-0.1871
APPLE-28	-0.0298	-0.0321	-0.0497	-0.0618	-0.0680	0.0497	-0.1437	-0.1821	-0.1326	-0.1157
APPLE-29	-0.1279	0.0617	0.1247	0.1405	-0.0313	-0.1127	0.0506	0.2525	0.0536	-0.2232
APPLE-30	0.1359	-0.0949	0.1050	-0.0589	-0.1803	-0.2563	0.1633	0.1319	-0.1027	-0.1678

Grade 5 Reading (continued)

	RAMOS-17	RAMOS-18	RAMOS-19	RAMOS-20	APPLE--1	APPLE--2	APPLE--3	APPLE--4	APPLE--5	APPLE--6
APPLE-31	-0.0579	-0.1257	-0.1295	-0.0844	-0.1245	0.6321	-0.1696	-0.1727	-0.0586	0.1874
APPLE-32	0.0074	-0.0237	-0.0951	-0.0705	-0.1208	0.2642	-0.1234	0.1196	-0.1179	0.0411
APPLE-33	0.0450	-0.0752	0.1725	0.2975	0.0486	-0.0924	0.0260	0.1415	-0.0281	-0.1808
APPLE-34	-0.0728	0.0437	-0.1102	0.0069	0.1337	0.1663	0.0529	-0.1921	0.1007	0.0466
APPLE-35	0.0614	-0.1201	0.2470	-0.0379	0.1718	0.0382	0.1335	-0.0153	0.1952	0.0508
APPLE-36	-0.0699	0.1604	0.2389	-0.0847	0.0726	0.1629	0.4536	-0.1135	0.2309	0.1525
APPLE-3	-0.1057	0.0288	0.2104	0.2167	-0.1373	0.0022	-0.0992	0.0869	-0.1243	-0.0238
APPLE-38	0.0147	0.0723	-0.1682	-0.1277	-0.0361	0.0783	-0.1545	0.0164	-0.0496	0.2050
APPLE-39	-0.1770	-0.0633	-0.1747	-0.0373	-0.0533	0.0266	-0.1426	-0.0388	0.1248	-0.0633
APPLE-40	-0.1183	-0.0259	-0.1278	-0.0469	0.0000	-0.1616	-0.2072	-0.0442	-0.0642	-0.0494
APPLE-41	0.0764	-0.1348	-0.1334	-0.1359	-0.0459	-0.0205	0.0076	0.0109	-0.0863	-0.0786
APPLE-42	0.3848	-0.0648	-0.0303	0.1945	0.2908	0.0189	-0.0711	-0.1839	-0.0145	0.4314
APPLE-43	0.0557	-0.0743	0.0389	0.1419	-0.0510	0.1003	0.1418	-0.1032	0.1672	0.4467
APPLE-44	-0.0651	-0.0683	-0.0703	-0.0458	-0.0224	-0.1153	-0.0955	-0.0138	0.3178	-0.0724
APPLE-45	0.0041	0.1488	0.0588	-0.0561	-0.1345	0.1869	0.0345	0.1259	-0.2089	-0.0095
APPLE-46	0.3256	0.0761	0.3989	-0.0247	0.3309	0.0441	0.2647	-0.2758	0.1294	0.1432
APPLE-47	-0.0334	-0.0270	0.0228	0.0018	0.0400	0.0315	0.0668	-0.0741	0.1501	0.1041
APPLE-48	0.1335	-0.0507	-0.1297	-0.0968	0.1867	0.0610	-0.1425	0.0843	-0.0225	0.0382
APPLE-49	0.0211	-0.1341	-0.1934	-0.0817	-0.0844	-0.1732	0.2967	-0.0320	0.4969	0.2770
APPLE-50	-0.0693	-0.0506	-0.1565	0.0191	-0.1320	-0.0135	-0.1488	-0.2228	0.0881	-0.0980
CATRC-GN	0.0211	0.0662	0.1497	-0.0969	0.2446	0.2398	0.0859	-0.1932	-0.0297	0.1076
RAPPL-GN	-0.0006	0.1120	0.0142	-0.0690	-0.0474	0.1438	-0.1979	0.3094	-0.2281	-0.1387
DECOD-GN	-0.1934	0.2910	-0.0376	-0.0276	-0.2770	0.0677	-0.1022	0.2797	0.0177	-0.1913
RACE.-GN	-0.1083	0.2384	-0.0159	-0.0207	0.0527	0.2608	-0.0875	0.0365	-0.1133	-0.0590
TOTRD-GN	-0.0342	0.2189	0.0527	-0.0601	0.0811	0.2892	-0.1526	0.1294	-0.2071	-0.1114

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Grade 5 Reading (continued)

	APPLE--7	APPLE--8	APPLE--9	APPLE-10	APPLE-11	APPLE-12	APPLE-13	APPLE-14	APPLE-15	APPLE-16
WD-----1	-0.1721	-0.1705	-0.1565	-0.0364	0.0512	-0.0723	0.0719	-0.0250	0.0743	-0.0550
WD-----2	0.0441	0.0481	-0.1600	-0.0102	-0.1564	-0.1132	0.1889	-0.0809	0.2895	0.0814
WD-----3	-0.3518	0.3041	0.1466	0.2491	-0.0172	-0.0618	-0.2619	-0.0526	-0.0322	0.1711
WD-----4	-0.2449	0.0398	-0.0568	0.3184	0.1613	0.0242	-0.1799	0.0007	0.1111	-0.0040
WD-----5	-0.1042	0.1670	0.1260	0.2909	0.1243	-0.0010	-0.1773	-0.0050	-0.0299	-0.0667
WD-----6	-0.0213	0.0945	-0.2525	0.0327	-0.1950	-0.1500	-0.1572	-0.0884	0.2550	0.1487
WD-----7	-0.0729	-0.1471	-0.1558	-0.0254	0.0132	-0.1117	-0.0497	-0.0684	0.0736	-0.1041
WD-----8	-0.1184	-0.1567	-0.0914	-0.0557	-0.0519	-0.1333	-0.1270	-0.1033	0.1586	-0.1372
WD-----9	-0.3470	0.0192	0.0106	0.2378	-0.1580	-0.0876	0.2181	-0.1102	0.0421	-0.0154
WD----10	-0.3464	-0.1271	0.0061	0.1515	-0.0352	0.0347	0.0493	-0.0753	-0.0991	0.1175
WD----11	-0.3590	-0.1014	0.0410	0.1950	-0.0216	-0.0687	0.0248	-0.0907	-0.1488	-0.1397
WD----12	-0.2614	-0.1188	-0.0908	0.0654	-0.0790	-0.0896	0.2584	-0.1845	-0.0096	-0.0335
WD----13	0.3226	0.0577	-0.1888	-0.1196	0.1472	0.0024	0.1710	-0.0544	-0.0697	-0.0664
WD----14	0.1747	0.0319	-0.0110	-0.0695	0.3510	-0.1692	0.0786	-0.1389	-0.1000	-0.2190
WD----15	0.0469	0.2093	-0.1678	0.1908	0.0880	0.0953	-0.0937	-0.0688	0.0458	0.0245
WD----16	0.1298	0.1176	-0.1428	0.0545	-0.0022	-0.1591	0.0508	-0.1327	-0.0307	-0.0356
WD----17	-0.0731	-0.1551	-0.2174	-0.0181	-0.1733	0.1221	-0.1131	-0.0176	0.1211	0.0873
WD----18	-0.0014	-0.1056	-0.2403	0.0851	-0.0726	0.1934	-0.1696	0.0415	0.1656	0.0406
WD----19	-0.0593	-0.0997	-0.1888	0.0272	-0.1078	0.1602	-0.1350	-0.0335	0.2066	0.0057
WD----20	-0.1940	-0.1715	-0.1278	-0.1400	-0.0584	-0.0892	-0.0976	-0.0271	0.1377	-0.0908
WD----21	-0.2875	-0.0553	-0.2395	0.0488	-0.0537	0.1444	0.1575	0.2844	0.2722	0.1113
WD----22	-0.3026	-0.0662	-0.2026	0.0544	-0.0124	-0.0245	0.0456	0.0524	0.1237	0.0325
WD----23	0.2872	-0.0590	0.1160	-0.1728	-0.0399	0.0808	-0.1328	0.1476	-0.2186	-0.1462
WD----24	0.0607	0.0587	-0.0164	-0.0559	0.0086	0.0817	0.0731	0.0042	0.0236	-0.0522
WD----25	-0.2890	0.0448	0.0600	0.0945	-0.0364	0.0197	-0.2675	-0.0681	0.3777	0.2003
WD----26	-0.0572	-0.1627	-0.0360	0.0836	-0.0376	-0.1143	0.0388	-0.1171	0.0830	0.0050
WD----27	0.0795	-0.1295	-0.1541	0.0335	-0.1259	0.2868	-0.0443	0.0380	0.0482	0.1032
WD----28	0.0000	-0.1569	-0.1361	-0.1259	-0.1312	-0.0534	0.0644	-0.0364	0.0583	-0.0338
WD----29	0.0658	-0.1732	-0.1535	-0.1613	-0.1757	-0.1035	0.0506	-0.1062	0.1525	0.0234
WD----30	-0.2003	-0.0759	-0.1216	0.0360	0.1117	-0.1516	-0.1250	-0.0864	0.1600	-0.1229
WD----31	-0.0165	-0.1924	0.0134	-0.1100	-0.0688	0.1365	0.0935	0.0394	-0.1914	0.0057
WD----32	0.1453	-0.0327	-0.0656	0.1536	-0.1328	0.3894	0.1792	0.0646	-0.0959	0.0984
WD----33	0.1409	-0.1307	-0.0595	-0.2352	0.0895	0.1811	-0.2405	0.2071	-0.1657	-0.0468
WD----34	-0.0186	-0.1475	0.0690	-0.1280	-0.1154	0.0012	0.0702	-0.0880	-0.0163	0.3125

Grade 5 Reading (continued)

	APPLE--7	APPLE--8	APPLE--9	APPLE-10	APPLE-11	APPLE-12	APPLE-13	APPLE-14	APPLE-15	APPLE-16
RAMOS--1	-0.0820	0.0592	0.1276	0.0681	0.1054	-0.1596	-0.1503	-0.2152	0.0429	0.3277
RAMOS--2	-0.0898	-0.1100	0.0712	0.2005	-0.0445	-0.0710	-0.0860	-0.1098	0.2578	0.3927
RAMOS--3	0.0527	-0.0836	-0.1088	-0.1316	0.2362	-0.0858	-0.1095	-0.1335	-0.1391	-0.0341
RAMOS--4	-0.1174	0.6642	0.3222	0.1113	-0.0588	-0.0486	-0.1563	-0.1370	-0.0580	0.0079
RAMOS--5	-0.0542	0.0677	0.2646	-0.1460	-0.1662	-0.0545	0.3106	0.1640	-0.2176	0.0702
RAMOS--6	0.4305	0.0522	0.1288	-0.1216	0.2366	-0.1778	-0.1502	-0.2270	-0.0363	-0.1358
RAMOS--7	-0.1546	-0.0215	-0.0313	0.1718	-0.1054	0.2518	-0.1441	0.1129	-0.0829	0.3994
RAMOS--8	-0.1585	-0.0226	-0.1111	-0.0656	0.2462	-0.0910	0.0054	0.0818	-0.0278	0.0635
RAMOS--9	0.1310	-0.0051	0.0187	-0.0795	0.1529	-0.0438	-0.3062	-0.1998	0.0102	0.2009
RAMOS-10	-0.1585	0.0458	0.1433	0.1170	-0.0542	-0.1011	-0.1180	-0.0431	-0.2324	0.2282
RAMOS-11	-0.1646	0.0296	0.0535	-0.1886	0.1163	-0.1684	-0.1201	-0.0597	-0.1624	-0.0550
RAMOS-12	0.0715	0.0132	0.0666	0.0396	-0.1471	-0.1978	-0.0374	0.0407	-0.1457	0.0353
RAMOS-13	0.1293	0.2293	-0.1186	0.2175	0.0629	-0.0501	-0.0140	-0.0375	-0.0403	-0.1155
RAMOS-14	0.2165	-0.0746	0.1403	-0.0884	0.1658	-0.0504	-0.1474	-0.1626	-0.1547	0.1372
RAMOS-15	-0.0617	0.0058	0.0271	-0.0573	0.0307	0.0292	-0.1981	0.0040	-0.1328	0.1894
RAMOS-16	-0.0933	0.0256	0.0926	0.1534	-0.0758	-0.0902	-0.0487	-0.1154	0.1873	0.2363
RAMOS-17	0.1081	-0.0385	0.1117	-0.0213	0.1149	-0.0854	-0.1266	-0.1539	0.1004	-0.0501
RAMOS-18	-0.1314	-0.1534	-0.0782	-0.0144	-0.0121	0.0205	0.0313	0.0401	-0.0157	0.1119
RAMOS-19	-0.1986	-0.1464	-0.0458	-0.0888	-0.0217	0.0607	-0.0405	-0.0530	0.1473	-0.0029
RAMOS-20	-0.1231	0.0602	0.2447	0.1326	0.3933	0.0291	-0.1127	0.0992	-0.1049	-0.0673

Grade 5 Reading (continued)

	APPLE--7	APPLE--8	APPLE--9	APPLE-10	APPLE-11	APPLE-12	APPLE-13	APPLE-14	APPLE-15	APPLE-16
APPLE--1	0.1115	-0.1631	0.0308	-0.1539	-0.1947	-0.1034	-0.1350	-0.1309	-0.0167	0.1515
APPLE--2	-0.2326	0.0756	-0.0397	0.0003	-0.1479	-0.0973	0.0673	-0.1743	0.1485	-0.0752
APPLE--3	-0.0531	-0.0655	-0.0628	-0.1867	-0.2633	-0.2063	-0.2185	-0.3128	0.2271	-0.0835
APPLE--4	-0.0963	0.0326	-0.1714	0.0993	0.1623	-0.2046	0.0348	-0.1102	-0.1083	-0.2318
APPLE--5	-0.0851	-0.1713	-0.0397	-0.1166	-0.1875	-0.1210	0.0747	-0.1074	0.1580	-0.0296
APPLE--6	-0.1221	0.0390	0.0953	-0.1919	-0.0756	-0.1487	-0.1358	-0.2821	0.1577	-0.0366
APPLE--7	1.0000	-0.1381	-0.0939	-0.3045	-0.0608	0.1227	0.1441	-0.0010	-0.1193	0.0630
APPLE--8	-0.1381	1.0000	0.2034	0.3665	0.0535	-0.1256	-0.1735	-0.0876	0.0306	-0.0061
APPLE--9	-0.0939	0.2034	1.0000	0.2586	0.0719	-0.2537	0.0005	-0.1445	-0.2063	-0.0378
APPLE-10	-0.3045	0.3665	0.2586	1.0000	0.1739	0.0234	-0.2123	-0.0677	-0.0933	0.1108
APPLE-11	-0.0608	0.0535	0.0719	0.1739	1.0000	0.0359	0.0149	0.1770	-0.0693	-0.1905
APPLE-12	0.1227	-0.1256	-0.2537	0.0234	0.0359	1.0000	-0.1763	0.6383	-0.2536	0.1804
APPLE-13	0.1441	-0.1735	0.0005	-0.2123	0.0149	-0.1763	1.0000	0.0650	0.1053	-0.0785
APPLE-14	-0.0010	-0.0876	-0.1445	-0.0677	0.1770	0.6383	0.0650	1.0000	-0.2668	-0.0597
APPLE-15	-0.1193	0.0306	-0.2063	-0.0933	-0.0693	-0.2536	0.1053	-0.2668	1.0000	-0.0264
APPLE-16	0.0630	-0.0061	-0.0378	0.1108	-0.1905	0.1804	-0.0785	-0.0597	-0.0264	1.0000
APPLE-17	-0.0170	-0.0975	-0.2192	-0.2742	0.0945	-0.0249	0.0256	0.0980	0.3307	-0.0732
APPLE-19	0.1601	0.1316	0.0938	0.0696	0.2191	-0.1469	0.0361	-0.0923	-0.1187	-0.1813
APPLE-20	-0.1391	0.1875	-0.0574	0.3160	0.0385	0.1619	0.0428	0.1228	-0.0423	0.1258
APPLE-21	0.1179	-0.1242	0.2016	0.0094	0.2067	0.1915	0.2157	0.3579	-0.0683	-0.0910
APPLE-22	-0.1106	-0.1238	0.0797	-0.0338	-0.0648	-0.0138	-0.0160	-0.0911	0.0097	-0.0444
APPLE-23	-0.1567	-0.0492	-0.1449	-0.2399	-0.1472	0.0390	-0.0014	-0.0010	0.3999	0.2345
APPLE-24	0.0489	0.2104	-0.1359	0.1570	-0.0244	0.0343	-0.1077	-0.0546	0.1736	-0.0256
APPLE-25	-0.0392	0.0846	0.0613	-0.0911	0.2041	0.1382	-0.1373	0.2736	-0.1696	-0.1257
APPLE-26	-0.0792	-0.2450	-0.0628	-0.0235	-0.1387	0.0399	-0.0290	-0.0717	0.2724	0.0031
APPLE-27	0.3647	-0.1496	0.1033	-0.0330	0.1923	0.0174	0.2455	0.1093	-0.2058	-0.0286
APPLE-28	-0.1245	0.0178	-0.1355	0.0858	-0.0802	0.3874	-0.0760	0.4153	-0.1762	0.1841
APPLE-29	0.0548	0.0804	-0.1517	0.0548	0.1801	-0.1964	-0.1723	-0.1893	0.2662	-0.1372
APPLE-30	0.2702	-0.0969	0.0493	-0.1659	-0.0244	0.0158	0.0522	0.0729	-0.2311	-0.1439

Grade 5 Reading (continued)

	APPLE--7	APPLE--8	APPLE--9	APPLE-10	APPLE-11	APPLE-12	APPLE-13	APPLE-14	APPLE-15	APPLE-16
APPLE-31	-0.0214	0.0336	0.0635	-0.0513	-0.0108	0.0261	0.2825	-0.1791	-0.0192	-0.0438
APPLE-32	-0.1306	0.1922	0.0117	0.0662	-0.0517	-0.0176	-0.1414	0.0695	-0.1728	-0.0258
APPLE-33	0.1777	0.1257	0.0692	-0.0711	0.1467	-0.0512	-0.0878	0.0516	-0.1045	-0.0417
APPLE-34	-0.0567	-0.0806	-0.0806	-0.1698	-0.1654	0.1585	-0.1401	0.2762	-0.1516	0.1068
APPLE-35	-0.2438	0.0050	-0.1982	-0.0752	0.0914	-0.0853	0.0343	-0.0722	0.2713	-0.1226
APPLE-36	-0.1788	-0.0359	-0.0115	0.0344	-0.1220	-0.0277	-0.1711	-0.1157	0.1591	0.1052
APPLE-37	-0.2105	-0.2034	0.0737	0.1663	0.1783	0.2324	-0.0445	0.1581	-0.1154	-0.1118
APPLE-38	-0.2225	0.1907	-0.1349	0.2467	-0.1228	0.0502	0.1021	-0.0731	0.4266	0.2133
APPLE-39	-0.0437	-0.0195	-0.1010	-0.1496	-0.1962	0.2405	0.0267	0.3248	-0.0810	0.0148
APPLE-40	-0.1529	-0.0420	0.3043	0.3471	0.1347	-0.0184	0.0679	-0.0991	0.2955	0.1381
APPLE-41	0.2392	-0.0281	0.0419	-0.0344	0.0041	-0.1729	-0.1617	-0.0992	0.0028	0.2087
APPLE-42	0.0267	-0.1653	0.4420	0.0295	0.0196	-0.1068	-0.0113	-0.1713	-0.0078	-0.0801
APPLE-43	-0.1608	-0.1422	-0.0768	0.0178	0.0032	-0.0052	-0.0777	-0.1095	0.1547	0.0918
APPLE-44	0.1184	-0.1237	0.0550	-0.1698	-0.1065	-0.1282	0.3577	0.1676	-0.1486	-0.0617
APPLE-45	0.1713	0.3661	-0.0267	0.0509	0.0850	0.1209	0.1697	0.1210	0.1538	-0.0968
APPLE-46	-0.1282	-0.1271	-0.1105	-0.1132	-0.0802	0.0242	-0.1191	-0.1216	0.4352	0.2985
APPLE-47	0.1584	-0.1777	-0.2014	-0.0303	-0.2712	0.1266	0.0428	-0.1752	0.3387	0.3897
APPLE-48	-0.2961	-0.1008	0.0091	0.0226	-0.0216	-0.1670	-0.0959	-0.0232	0.0416	-0.0268
APPLE-49	0.1539	-0.0801	-0.1409	-0.2085	-0.0054	-0.1106	-0.0272	-0.0499	0.0111	-0.0890
APPLE-50	0.1193	0.0682	0.4076	0.0697	-0.0096	-0.0672	0.2861	0.1351	-0.2632	0.1382
CATRC-GN	0.1541	-0.1705	-0.0686	-0.1002	-0.0679	-0.0582	0.0328	-0.0901	0.2058	-0.1989
RAPPL-GN	0.0606	-0.1248	-0.2826	-0.2532	-0.1121	0.1180	0.0498	0.0531	0.1043	-0.0851
CECOC-GN	-0.0567	-0.1161	-0.1757	-0.0720	-0.0224	0.0771	0.3536	0.1069	0.2190	-0.0810
RACH.-GN	0.0024	0.0452	0.0390	0.1101	-0.1031	-0.1834	0.2642	-0.2059	0.1704	-0.0297
TOTRC-GN	0.0847	-0.1742	-0.1472	-0.1284	-0.1179	-0.0356	0.1321	-0.1148	0.1705	-0.1298

Grade 5 Reading (continued)

	APPLE-17	APPLE-19	APPLE-20	APPLE-21	APPLE-22	APPLE-23	APPLE-24	APPLE-25	APPLE-26	APPLE-27
WD-----1	0.2195	0.2032	0.1750	-0.2524	-0.3389	0.0636	-0.0647	0.1780	0.0669	-0.0819
WD-----2	0.2523	-0.1745	0.3863	-0.1355	-0.3003	0.3787	-0.1073	-0.3181	0.1215	-0.0708
WD-----3	-0.0705	0.0524	0.2181	-0.2369	-0.2432	0.2033	0.2971	0.2579	0.0141	-0.2911
WD-----4	0.0623	0.0558	0.2835	-0.2128	-0.1402	-0.0013	0.1846	0.0108	-0.0111	-0.2692
WD-----5	0.0054	-0.0039	0.2237	0.2952	-0.1792	-0.0329	0.0344	-0.0517	-0.0094	0.3812
WD-----6	0.1583	-0.0222	0.2179	-0.2721	0.0074	0.0392	0.3137	-0.0580	0.1021	-0.1183
WD-----7	0.0752	0.3519	-0.0803	-0.1111	-0.0386	-0.1974	0.2134	0.3302	-0.1072	-0.0764
WD-----8	0.1557	0.0710	0.0224	-0.1381	-0.0394	0.0052	0.1927	0.2285	0.0829	-0.1393
WD-----9	-0.2090	0.1945	-0.0307	-0.2881	0.1949	-0.0916	0.2170	-0.0230	0.2263	-0.2063
WD----10	-0.0167	0.0599	-0.0403	-0.3074	0.1288	-0.0240	-0.0529	-0.0045	0.0280	-0.1898
WD----11	-0.1233	0.1537	-0.0435	-0.1146	0.3263	-0.2615	0.1386	-0.0216	0.2131	-0.0174
WD----12	-0.1722	0.0828	-0.0446	-0.2658	0.3298	-0.1389	0.2357	-0.0957	0.2475	-0.2098
WD----13	-0.0913	0.2103	-0.2832	0.0786	0.0722	-0.1720	-0.0414	-0.1077	-0.0719	0.1615
WD----14	-0.1616	0.2071	-0.2342	0.3746	0.0574	-0.2399	-0.0775	-0.0424	-0.3078	0.4152
WD----15	-0.1878	0.1803	-0.1268	-0.0039	0.0050	-0.0273	-0.0393	-0.1901	-0.0738	-0.0555
WD----16	-0.2478	0.1377	-0.0447	0.0597	0.0189	-0.1199	0.0197	-0.0716	-0.0824	0.0360
WD----17	-0.1170	0.0261	0.2263	-0.1242	-0.0608	-0.1089	0.1607	-0.0323	0.0137	-0.0892
WD----18	-0.1577	-0.0429	0.2295	-0.0922	0.0266	-0.1504	0.2004	0.0117	0.0313	-0.0451
WD----19	0.0321	-0.0249	0.1212	-0.1266	-0.0027	-0.0532	0.1763	-0.0161	0.1126	-0.1522
WD----20	0.1206	-0.0198	0.1308	-0.1304	-0.0418	0.0214	0.1101	-0.0117	0.0498	-0.1317
WD----21	-0.0589	0.0552	-0.0064	-0.1091	0.2204	0.1557	0.1483	-0.0054	0.1786	-0.2489
WD----22	0.0191	-0.0243	0.1011	-0.3408	0.0637	0.2034	0.0155	-0.0698	0.2947	-0.3775
WD----23	0.0906	-0.1121	-0.1148	0.0477	0.0908	-0.0963	-0.1712	0.1717	0.1121	-0.0480
WD----24	0.2024	-0.3296	0.2474	-0.2116	-0.1417	0.2925	-0.0619	-0.0637	0.0729	-0.3001
WD----25	-0.0662	-0.0389	0.0361	-0.1055	0.0158	0.1102	0.0883	0.0337	0.1299	-0.1584
WD----26	-0.0241	0.3952	-0.2446	0.2552	-0.0258	-0.1896	-0.0392	0.0937	-0.1386	0.3293
WD----27	0.0204	-0.0813	0.1492	0.0062	0.1517	-0.0249	0.4330	0.1398	0.2081	-0.1205
WD----28	0.1295	0.0076	0.1880	-0.1425	0.0086	-0.0374	0.0489	-0.0194	-0.0086	-0.0877
WD----29	0.2228	-0.0581	0.1846	-0.1631	-0.0347	0.0672	0.0705	-0.0486	0.0341	-0.1168
WD----30	-0.0368	-0.0438	0.0067	-0.0917	0.1756	-0.0168	0.2203	0.0989	0.0759	-0.0957
WD----31	0.1449	-0.0597	0.2596	-0.1180	-0.1716	0.0119	-0.1018	0.0146	0.0701	-0.1339
WD----32	-0.1780	0.0629	0.1985	0.1091	-0.0066	-0.3573	0.0762	0.1286	-0.1333	0.1010
WD----33	0.0140	-0.0737	-0.1168	-0.0905	-0.2107	-0.0747	-0.1929	0.1607	-0.0160	-0.0250
WD----34	-0.0802	-0.1412	-0.2606	-0.0463	0.2200	0.1838	-0.0647	-0.0869	0.0308	-0.0027

Grade 5 Reading (continued)

	APPLE-17	APPLE-19	APPLE-20	APPLE-21	APPLE-22	APPLE-23	APPLE-24	APPLE-25	APPLE-26	APPLE-27
RAMOS--1	-0.0845	0.0860	-0.1936	-0.2030	-0.0653	0.0826	0.1679	0.2868	-0.0110	-0.2008
RAMOS--2	0.1516	-0.0812	0.1043	-0.2271	-0.3148	0.3990	0.0278	0.1761	0.2448	-0.2912
RAMOS--3	-0.1584	0.1134	-0.3301	0.0075	0.2315	-0.2523	0.1687	0.0262	-0.2171	0.1066
RAMOS--4	-0.2006	0.0913	0.0031	-0.0305	0.0182	-0.0576	0.0243	0.3401	-0.0548	-0.0725
RAMOS--5	-0.0959	0.1565	-0.0448	-0.0175	0.0370	-0.1599	-0.0217	0.0260	-0.1153	-0.0742
RAMOS--6	0.0791	0.2382	-0.2311	-0.1486	-0.0877	-0.0337	0.0312	0.1804	-0.0506	0.1079
RAMOS--7	-0.1550	-0.0984	0.0129	0.0564	-0.1166	-0.0079	0.2673	-0.0853	-0.0278	-0.1844
RAMOS--8	0.2445	-0.2902	0.1593	-0.1149	-0.0338	0.4025	-0.1527	-0.0843	0.2543	-0.1798
RAMOS--9	0.0560	0.0168	-0.2219	-0.1791	-0.0131	0.0703	0.1958	0.0109	-0.0347	-0.0791
RAMOS-10	-0.0799	0.1810	-0.0641	-0.1571	-0.0894	0.0225	0.1293	0.2153	0.0490	-0.1653
RAMOS-11	0.0627	0.0297	-0.1104	-0.1056	-0.0035	0.1509	0.0950	0.2280	-0.0138	-0.1512
RAMOS-12	0.0130	-0.0460	-0.1239	-0.1283	0.1057	-0.0825	-0.0778	-0.1289	0.1401	-0.1064
RAMOS-13	-0.0118	0.2565	-0.0101	-0.0895	-0.0833	-0.1415	0.4649	-0.0973	-0.1449	-0.1154
RAMOS-14	-0.0786	0.0175	-0.1083	-0.1317	0.0566	0.0825	-0.2235	0.0864	0.1007	0.0690
RAMOS-15	-0.0735	0.0763	-0.2380	-0.0058	-0.0930	-0.0228	0.0064	0.0845	-0.1627	0.0186
RAMOS-16	0.1516	-0.1982	0.1439	-0.0716	-0.0941	0.1834	0.1090	-0.1383	0.1006	-0.1695
RAMOS-17	0.2879	-0.1243	-0.0703	-0.1361	0.1079	0.0591	-0.1023	0.0447	0.4945	-0.0841
RAMOS-18	-0.0782	-0.1719	0.2733	-0.0286	-0.1813	0.1961	0.0788	0.0837	0.0693	-0.0869
RAMOS-19	-0.0767	0.1302	-0.0809	-0.0942	0.3072	-0.1796	0.3308	-0.0946	-0.1854	-0.0954
RAMOS-20	-0.1002	-0.0604	0.1500	-0.0614	-0.0732	0.0734	0.0359	-0.0617	-0.1452	-0.0680

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Grade 5 Reading (continued)

	APPLE-17	APPLE-19	APPLE-20	APPLE-21	APPLE-22	APPLE-23	APPLE-24	APPLE-25	APPLE-26	APPLE-27
APPLE--1	-0.0316	-0.0648	-0.1624	-0.0779	0.3277	-0.0346	-0.0687	-0.0617	0.1818	0.0371
APPLE--2	-0.0769	-0.2731	0.1032	-0.1979	0.1929	0.3024	-0.1302	-0.0543	0.1406	-0.1878
APPLE--3	-0.0551	0.0285	-0.3118	-0.1430	0.2077	0.1000	0.2989	-0.0234	0.0693	-0.1543
APPLE--4	-0.0337	0.5048	0.2391	-0.1343	-0.3004	-0.2436	0.1356	0.1417	-0.1721	0.1306
APPLE--5	-0.2247	-0.0717	-0.1597	-0.1177	0.3385	0.1106	0.1557	-0.1400	0.1163	-0.1474
APPLE--6	0.1966	-0.2059	-0.1138	-0.0917	0.0153	0.4726	-0.2268	0.0494	0.4966	-0.1871
APPLE--7	-0.0170	0.1601	-0.1391	0.1179	-0.1106	-0.1567	0.0489	-0.0392	-0.0792	0.3647
APPLE--8	-0.0975	0.1316	0.1875	-0.1242	-0.1238	-0.0492	0.2104	0.0846	-0.2450	-0.1496
APPLE--9	-0.2192	0.0938	-0.0574	0.2016	0.0797	-0.1449	-0.1359	0.0613	-0.0628	0.1033
APPLE-10	-0.2742	0.0696	0.3160	0.0094	-0.0338	-0.2399	0.1570	-0.0911	-0.0235	-0.0330
APPLE-11	0.0945	0.2191	0.0385	0.2047	-0.0648	-0.1472	-0.0244	0.2041	-0.1387	0.1923
APPLE-12	-0.0249	-0.1469	0.1619	0.1915	-0.0138	0.0390	0.0343	0.1382	0.0399	0.0174
APPLE-13	0.0256	0.0361	0.0428	0.2157	-0.0160	-0.0014	-0.1077	-0.1373	-0.0290	0.2455
APPLE-14	0.0980	-0.0923	0.1228	0.3579	-0.0911	-0.0010	-0.0546	0.2736	-0.0717	0.1093
APPLE-15	0.3307	-0.1187	-0.0423	-0.0683	0.0097	0.3999	0.1736	-0.1696	0.2724	-0.2058
APPLE-16	-0.0732	-0.1813	0.1258	-0.0910	-0.0444	0.2345	-0.0256	-0.1257	0.0031	-0.0286
APPLE-17	1.0000	-0.2460	0.1195	-0.0543	-0.1621	0.4344	-0.1444	-0.0120	0.2873	-0.1721
APPLE-19	-0.2460	1.0000	-0.4571	0.0487	-0.0043	-0.5520	0.2180	0.3011	-0.3315	0.4395
APPLE-20	0.1195	-0.4571	1.0000	-0.1637	-0.3451	0.2203	-0.0129	-0.0939	0.0880	-0.3095
APPLE-21	-0.0543	0.0487	-0.1637	1.0000	-0.0746	-0.1749	-0.0278	0.1008	-0.0549	0.6630
APPLE-22	-0.1621	-0.0043	-0.3451	-0.0746	1.0000	-0.3189	0.2313	-0.1429	0.0808	-0.0837
APPLE-23	0.4344	-0.5520	0.2203	-0.1749	-0.3189	1.0000	-0.2537	-0.0888	0.3933	-0.3635
APPLE-24	-0.1444	0.2180	-0.0129	-0.0278	0.2313	-0.2537	1.0000	0.0659	-0.1460	-0.0895
APPLE-25	-0.0120	0.3011	-0.0939	0.1008	-0.1429	-0.0888	0.0659	1.0000	-0.0861	-0.0123
APPLE-26	0.2873	-0.3315	0.0880	-0.0549	0.0808	0.3933	-0.1460	-0.0861	1.0000	-0.2331
APPLE-27	-0.1721	0.4395	-0.3095	0.6630	-0.0837	-0.3635	-0.0895	-0.0123	-0.2331	1.0000
APPLE-28	-0.0766	-0.1844	-0.0053	-0.0313	0.0541	0.0847	-0.1285	0.0239	-0.0377	-0.0688
APPLE-29	-0.0006	0.3929	-0.0783	-0.1062	0.0358	-0.2343	0.1238	-0.0680	-0.0940	0.0058
APPLE-30	-0.0259	0.2005	-0.2729	-0.0272	-0.1114	-0.2669	-0.1159	0.1036	-0.2140	-0.0247

Grade 5 Reading (continued)

	APPLE-17	APPLE-19	APPLE-20	APPLE-21	APPLE-22	APPLE-23	APPLE-24	APPLE-25	APPLE-26	APPLE-27
APPLE-31	-0.1080	-0.1695	0.0621	-0.0514	0.2656	0.1187	-0.1752	-0.0705	0.0882	-0.1352
APPLE-32	0.0117	-0.0874	0.0855	-0.0680	0.0561	0.0570	-0.1470	-0.0187	-0.0462	-0.1122
APPLE-33	-0.1450	0.1759	-0.0918	0.1432	0.2306	-0.2502	0.3795	0.0188	-0.1482	0.2197
APPLE-34	0.0430	-0.1517	-0.1234	-0.1690	0.0411	0.2854	-0.1816	-0.0013	-0.0031	-0.0824
APPLE-35	0.1216	0.1132	-0.2568	-0.0373	0.4619	-0.1543	0.2201	-0.0714	0.0870	-0.0698
APPLE-36	0.1106	-0.1356	-0.0108	-0.0853	0.1819	0.1766	0.2913	0.0210	0.0786	-0.1500
APPLE-37	0.0403	0.1225	-0.0697	-0.0402	0.0166	-0.0143	-0.2058	-0.0073	-0.0817	-0.1064
APPLE-38	0.2098	-0.4467	0.5994	-0.1365	-0.3534	0.4728	0.0028	-0.3074	0.3109	-0.2982
APPLE-39	-0.1590	-0.0007	-0.1283	-0.1000	0.1341	0.0939	-0.0754	-0.1088	-0.0850	-0.0497
APPLE-40	-0.0531	0.1722	-0.1346	0.2570	-0.0195	-0.0149	-0.0678	-0.1196	0.0056	0.0948
APPLE-41	-0.1136	-0.0672	0.0598	0.0225	-0.0739	-0.0940	-0.0954	-0.0873	-0.1821	0.1019
APPLE-42	-0.0028	-0.2233	0.0071	0.0360	0.2135	0.0456	-0.1399	-0.1306	0.3908	-0.1046
APPLE-43	0.3837	-0.3523	0.1885	-0.1235	-0.1560	0.4592	-0.1333	-0.1928	0.3286	-0.1938
APPLE-44	-0.0368	-0.0462	0.1428	-0.0614	0.1177	-0.0926	-0.1131	-0.0431	-0.1026	-0.0179
APPLE-45	0.2243	0.0310	0.3446	0.0219	-0.1865	0.1385	0.0895	-0.0915	0.0158	0.0069
APPLE-46	0.1822	-0.2378	-0.0918	-0.0832	0.4459	0.1153	0.2708	-0.1370	0.2346	-0.1794
APPLE-47	-0.0677	-0.1354	0.0516	-0.0775	-0.1362	0.4061	-0.1422	-0.1779	0.2599	-0.0161
APPLE-48	0.0192	-0.0420	0.0347	-0.0577	0.2051	-0.1122	-0.1446	-0.0824	0.2621	-0.1148
APPLE-49	-0.0475	-0.0204	-0.1874	0.0802	-0.0261	0.1616	-0.1940	-0.1738	0.2365	0.0735
APPLE-50	-0.1372	-0.0143	-0.0407	0.3875	0.0729	-0.1663	-0.0596	-0.1401	-0.1752	0.3124
CATRC-GN	0.0517	-0.1792	-0.1889	0.1384	0.1652	0.0821	0.0941	-0.2593	0.1656	0.0266
RAPPL-GN	0.0224	0.0809	0.0070	-0.1374	-0.0763	0.0212	-0.2260	0.0143	0.0405	0.0232
CECOC-GN	-0.1287	-0.0343	0.2698	-0.0693	-0.3156	0.1097	0.0282	0.1293	-0.0113	-0.1877
RACH.-GN	-0.1061	0.1880	-0.1159	0.0646	0.0716	-0.0267	-0.0597	0.1332	-0.0111	0.1824
TOTRD-GN	-0.0644	0.0826	-0.1550	-0.0226	0.0529	-0.0179	-0.1832	-0.0211	0.0656	0.1080

Grade 5 Reading (continued)

	APPLE-28	APPLE-29	APPLE-30	APPLE-31	APPLE-32	APPLE-33	APPLE-34	APPLE-35	APPLE-36	APPLE-37
WD-----1	-0.1029	-0.1008	0.1988	-0.0852	-0.0671	-0.2409	-0.1662	-0.1616	-0.0849	0.1483
WD-----2	-0.0373	-0.0238	-0.0702	0.0650	-0.0384	0.0021	0.0675	-0.1876	0.0408	-0.0206
WD-----3	-0.1540	-0.1725	-0.1325	-0.1183	-0.0744	0.1244	0.0082	-0.1953	0.1682	-0.1631
WD-----4	-0.1308	0.0495	-0.0299	-0.1157	0.0855	0.1136	-0.1094	-0.0348	-0.0356	0.1438
WD-----5	-0.0056	-0.0646	-0.2274	-0.1504	-0.0732	-0.0860	0.0407	-0.1357	0.1360	-0.1434
WD-----6	-0.0239	0.1575	-0.1510	-0.2928	-0.1564	0.1254	0.0999	0.0201	0.1606	-0.2844
WD-----7	-0.1241	0.1343	0.3125	-0.1570	-0.0819	-0.0749	-0.1702	0.0083	-0.0171	0.0434
WD-----8	-0.1590	0.0489	0.0575	-0.2002	-0.1218	-0.0910	-0.0699	0.1149	0.1630	-0.1037
WD-----9	0.0159	-0.1036	0.0421	0.1878	-0.0491	-0.1353	-0.0963	0.1706	0.0373	0.1325
WD----10	-0.0079	-0.0574	0.0037	0.1978	0.2031	-0.1344	-0.1291	0.1113	-0.0556	0.2514
WD----11	-0.1335	-0.0885	-0.0415	0.1368	-0.0092	-0.1347	-0.2280	0.2256	0.0530	-0.0431
WD----12	-0.1998	-0.1258	0.0273	0.2797	-0.1634	-0.1044	-0.2869	0.2629	-0.0176	-0.0627
WD----13	0.0656	0.2285	0.2403	0.0711	-0.1451	0.0064	-0.0669	-0.0490	-0.0532	-0.0511
WD----14	-0.0951	0.1070	-0.0379	0.0723	-0.1282	0.2395	-0.1260	0.0007	-0.0931	-0.0660
WD----15	0.1198	0.4947	0.0389	-0.0223	-0.0450	-0.1763	0.1470	0.0715	-0.0785	-0.0336
WD----16	-0.0140	0.4197	-0.0526	-0.1053	-0.0514	0.1232	0.0968	0.0009	-0.1079	-0.0994
WD----17	-0.1459	0.0991	0.0676	-0.2219	-0.1541	-0.0345	-0.1317	0.0519	0.1551	-0.0654
WD----18	-0.1120	0.1494	-0.0393	-0.1811	-0.1434	0.0454	-0.1727	0.0963	0.0406	-0.1611
WD----19	-0.1339	-0.0502	0.0141	-0.1895	-0.1032	-0.0133	-0.2096	0.1006	0.0387	-0.0457
WD----20	-0.1463	-0.0002	0.0795	-0.1828	-0.0689	0.0237	-0.0824	0.0479	0.2314	0.0028
WD----21	0.1179	0.0865	-0.1369	0.0787	-0.1031	-0.1055	0.0762	0.1669	-0.0015	0.0990
WD----22	0.0228	0.0671	0.0618	0.1243	-0.0019	-0.1878	0.0330	0.0948	0.0935	0.1093
WD----23	0.0404	-0.0831	0.3654	-0.0800	0.4071	-0.0002	-0.0665	-0.1377	-0.1701	0.0097
WD----24	0.1817	-0.0004	-0.0256	0.2459	-0.1002	-0.3189	0.2818	-0.2016	0.0997	0.0935
WD----25	-0.1474	0.0395	-0.2224	-0.0968	-0.0501	-0.0015	-0.1393	0.0817	0.2593	0.0805
WD----26	-0.1585	0.0663	0.0077	-0.0208	-0.0163	0.1045	-0.1830	0.1919	-0.2583	0.2284
WD----27	0.0192	0.0025	-0.0624	-0.1403	0.0101	0.0248	-0.1369	0.0585	0.1365	-0.0379
WD----28	-0.1281	0.0556	0.1048	-0.1877	-0.0963	-0.0495	-0.0518	0.0798	0.0734	-0.0078
WD----29	-0.1528	0.0688	0.0565	-0.2034	-0.0534	-0.0894	-0.0111	0.0486	0.1514	-0.0464
WD----30	-0.0717	-0.0121	-0.0015	-0.0890	-0.0090	0.1255	-0.1929	0.1156	0.1155	-0.0263
WD----31	-0.1014	-0.1682	0.0798	-0.1544	-0.0648	-0.0905	-0.0358	-0.0476	-0.0592	0.0376
WD----32	0.1379	-0.1885	-0.0049	0.1036	0.0312	-0.3408	-0.2309	0.1192	-0.0079	-0.0448
WD----33	-0.0357	-0.0557	0.1264	-0.1871	-0.0718	0.0610	0.0846	-0.2355	-0.0688	-0.0651
WD----34	0.0204	-0.2869	0.1626	0.2414	-0.1031	0.0996	0.1186	0.0057	-0.1794	0.0566

Grade 5 Reading (continued)

	APPLE-28	APPLE-29	APPLE-30	APPLE-31	APPLE-32	APPLE-33	APPLE-34	APPLE-35	APPLE-36	APPLE-37
RAMOS--1	-0.0098	-0.0848	-0.0326	0.0175	0.0750	0.1515	0.0982	0.0007	0.1641	0.1824
RAMOS--2	-0.0044	-0.0054	-0.0726	-0.0527	-0.1236	-0.2306	0.1090	-0.1201	0.2606	0.1216
RAMOS--3	-0.0434	0.0260	-0.0006	0.0281	0.1707	0.3348	-0.0498	0.1769	-0.1099	0.0859
RAMOS--4	0.0158	-0.1835	-0.0531	0.1559	0.1685	0.1945	0.0087	-0.0746	0.0701	-0.0869
RAMOS--5	0.1210	-0.2108	0.2277	-0.0465	-0.0672	0.0478	0.2061	-0.0946	0.0412	0.1595
RAMOS--6	-0.1433	0.0584	0.0668	-0.0471	-0.0421	0.0705	0.0555	-0.0658	0.0644	-0.1363
RAMOS--7	0.2033	-0.2336	0.0275	-0.1067	-0.0298	0.1234	0.0634	0.0213	0.0320	0.1874
RAMOS--8	-0.0130	-0.1318	-0.1298	-0.0109	0.4488	0.0567	-0.0073	0.0388	0.0882	0.0864
RAMOS--9	-0.0164	-0.0731	-0.1241	-0.1326	-0.0177	0.2880	0.2137	0.1563	0.2229	0.0997
RAMOS-10	0.1674	-0.0978	0.0135	-0.1321	0.0843	-0.0189	0.1612	-0.1467	0.1170	0.1378
RAMOS-11	-0.0013	-0.2737	-0.1635	-0.0351	0.1061	0.2957	0.1393	0.1406	0.2505	0.0286
RAMOS-12	-0.0326	-0.0998	0.3475	-0.0373	-0.1108	0.0373	0.1088	-0.0373	-0.0925	-0.0494
RAMOS-13	-0.0788	0.3101	0.0047	-0.1026	-0.0307	-0.0328	-0.0985	0.1135	-0.0537	-0.0755
RAMOS-14	0.0694	-0.1001	-0.1411	0.1839	0.1376	-0.0598	0.1303	-0.1307	-0.0541	-0.0660
RAMOS-15	0.1182	-0.1296	0.0041	-0.2116	0.0261	0.3047	0.2908	0.0791	0.1865	0.2366
RAMOS-16	0.0169	-0.0992	-0.1128	-0.0692	-0.1031	-0.0306	-0.1528	-0.0186	0.0474	-0.0886
RAMOS-17	-0.0298	-0.1279	0.1359	-0.0579	0.0074	0.0450	-0.0728	0.0614	-0.0699	-0.1057
RAMOS-18	-0.0321	0.0617	-0.0949	-0.1257	-0.0237	-0.0752	0.0437	-0.1201	0.1604	0.0288
RAMOS-19	-0.0497	0.1247	0.1050	-0.1295	-0.0951	0.1725	-0.1102	0.2470	0.2389	0.2104
RAMOS-20	-0.0618	0.1405	-0.0589	-0.0844	-0.0705	0.2975	0.0069	-0.0379	-0.0847	0.2167

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Grade 5 Reading (continued)

	APPLE-28	APPLE-29	APPLE-30	APPLE-31	APPLE-32	APPLE-33	APPLE-34	APPLE-35	APPLE-36	APPLE-37
APPLE--1	-0.0680	-0.0313	-0.1803	-0.1245	-0.1208	0.0486	0.1337	0.1718	0.0726	-0.1373
APPLE--2	0.0497	-0.1127	-0.2563	0.6321	0.2642	-0.0924	0.1663	0.0382	0.1629	0.0022
APPLE--3	-0.1437	0.0506	0.1633	-0.1696	-0.1234	0.0260	0.0529	0.1335	0.4536	-0.0992
APPLE--4	-0.1821	0.2525	0.1319	-0.1727	0.1196	0.1415	-0.1921	-0.0153	-0.1135	0.0869
APPLE--5	-0.1326	0.0536	-0.1027	-0.0586	-0.1179	-0.0281	0.1007	0.1952	0.2309	-0.1243
APPLE--6	-0.1157	-0.2232	-0.1678	0.1874	0.0411	-0.1808	0.0466	0.0508	0.1525	-0.0238
APPLE--7	-0.1245	0.0548	0.2702	-0.0214	-0.1306	0.1777	-0.0567	-0.2438	-0.1788	-0.2105
APPLE--8	0.0178	0.0804	-0.0969	0.0336	0.1922	0.1257	-0.0806	0.0050	-0.0359	-0.2034
APPLE--9	-0.1355	-0.1517	0.0493	0.0635	0.0117	0.0692	-0.0806	-0.1982	-0.0115	0.0737
APPLE-10	0.0858	0.0548	-0.1659	-0.0513	0.0662	-0.0711	-0.1698	-0.0752	0.0344	0.1663
APPLE-11	-0.0802	0.1801	-0.0244	-0.0108	-0.0517	0.1467	-0.1654	0.0914	-0.1220	0.1783
APPLE-12	0.3874	-0.1964	0.0158	0.0261	-0.0176	-0.0512	0.1585	-0.0853	-0.0277	0.2324
APPLE-13	-0.0760	-0.1723	0.0522	0.2825	-0.1414	-0.0878	-0.1401	0.0343	-0.1711	-0.0445
APPLE-14	0.4153	-0.1893	0.0729	-0.1791	0.0695	0.0516	0.2762	-0.0722	-0.1157	0.1581
APPLE-15	-0.1762	0.2662	-0.2311	-0.0192	-0.1728	-0.1045	-0.1516	0.2713	0.1591	-0.1154
APPLE-16	0.1841	-0.1372	-0.1439	-0.0438	-0.0258	-0.0417	0.1068	-0.1226	0.1052	-0.1118
APPLE-17	-0.0766	-0.0006	-0.0259	-0.1080	0.0117	-0.1450	0.0430	0.1216	0.1106	0.0403
APPLE-19	-0.1844	0.3929	0.2005	-0.1695	-0.0874	0.1759	-0.1517	0.1132	-0.1356	0.1225
APPLE-20	-0.0053	-0.0783	-0.2729	0.0621	0.0855	-0.0918	-0.1234	-0.2568	-0.0108	-0.0697
APPLE-21	-0.0313	-0.1062	-0.0272	-0.0514	-0.0680	0.1432	-0.1690	-0.0373	-0.0853	-0.0402
APPLE-22	0.0541	0.0358	-0.1114	0.2656	0.0561	0.2306	0.0411	0.4619	0.1819	0.0166
APPLE-23	0.0847	-0.2343	-0.2669	0.1187	0.0570	-0.2502	0.2854	-0.1543	0.1766	-0.0143
APPLE-24	-0.1285	0.1238	-0.1159	-0.1752	-0.1470	0.3795	-0.1816	0.2201	0.2913	-0.2058
APPLE-25	0.0239	-0.0680	0.1036	-0.0705	-0.0187	0.0188	-0.0013	-0.0714	0.0210	-0.0073
APPLE-26	-0.0377	-0.0940	-0.2140	0.0882	-0.0462	-0.1482	-0.0031	0.0870	0.0786	-0.0817
APPLE-27	-0.0688	0.0058	-0.0247	-0.1352	-0.1122	0.2197	-0.0824	-0.0698	-0.1500	-0.1064
APPLE-28	1.0000	-0.1553	0.0235	-0.0904	0.0337	-0.1465	0.6862	-0.1450	-0.0859	0.2376
APPLE-29	-0.1553	1.0000	0.0254	-0.1499	-0.0563	-0.0262	-0.0554	0.1685	-0.0658	-0.0770
APPLE-30	0.0235	0.0254	1.0000	-0.0418	-0.0850	-0.1141	-0.1061	-0.1426	-0.1800	0.0896

Grade 5 Reading (continued)

	APPLE-28	APPLE-29	APPLE-30	APPLE-31	APPLE-32	APPLE-33	APPLE-34	APPLE-35	APPLE-36	APPLE-37
APPLE-31	-0.0904	-0.1499	-0.0418	1.0000	0.2813	-0.1479	-0.1620	-0.1044	-0.0586	0.1566
APPLE-32	0.0337	-0.0563	-0.0850	0.2813	1.0000	-0.0862	-0.0518	-0.0949	-0.0717	0.2011
APPLE-33	-0.1465	-0.0262	-0.1141	-0.1479	-0.0862	1.0000	-0.1046	0.2055	-0.0357	-0.0376
APPLE-34	0.6862	-0.0554	-0.1061	-0.1620	-0.0518	-0.1046	1.0000	-0.1192	0.1830	0.1131
APPLE-35	-0.1450	0.1685	-0.1426	-0.1044	-0.0949	0.2055	-0.1192	1.0000	0.1145	-0.0420
APPLE-36	-0.0859	-0.0658	-0.1800	-0.0586	-0.0717	-0.0357	0.1830	0.1145	1.0000	-0.0758
APPLE-37	0.2376	-0.0770	0.0896	0.1566	0.2011	-0.0376	0.1131	-0.0420	-0.0758	1.0000
APPLE-38	0.0484	-0.2062	-0.3270	-0.0454	-0.1334	-0.2819	-0.0872	0.0199	-0.0759	-0.2014
APPLE-39	0.5796	0.1334	0.0340	-0.0602	-0.0468	-0.0183	0.6277	0.0237	-0.1087	0.0866
APPLE-40	-0.0876	0.1084	-0.1027	0.0065	-0.0166	-0.0375	-0.1725	0.1813	-0.1164	0.4455
APPLE-41	-0.1185	0.0093	0.2756	-0.0859	-0.1694	0.3562	-0.1879	0.0280	-0.0478	-0.1960
APPLE-42	-0.0145	-0.0825	-0.1008	0.0932	-0.0272	0.0881	-0.0617	-0.0883	-0.1113	-0.0351
APPLE-43	0.0193	-0.1749	-0.2368	-0.0723	-0.0035	-0.2288	0.2252	0.1144	0.2299	0.0461
APPLE-44	-0.0719	0.0129	-0.0278	-0.0852	-0.0483	0.0003	0.1350	0.0986	-0.0917	-0.0418
APPLE-45	0.0348	-0.0025	-0.0529	0.1190	0.1683	0.0713	-0.0032	-0.1101	0.1434	0.1173
APPLE-46	-0.1216	-0.0145	-0.0681	0.0148	-0.0563	0.0722	-0.1858	0.4081	0.3674	-0.0558
APPLE-47	-0.0669	-0.0485	-0.1445	0.0175	-0.0943	-0.0455	-0.0893	0.0248	-0.0849	-0.1333
APPLE-48	-0.0133	0.1171	-0.1876	-0.0850	-0.0758	0.1352	0.0308	0.5311	-0.0297	-0.0939
APPLE-49	-0.1992	0.1006	0.1367	-0.0544	-0.0107	-0.0660	0.0755	0.0381	0.0006	-0.1890
APPLE-50	-0.0977	-0.0455	0.0919	0.1091	0.0564	-0.0151	0.0439	0.0108	-0.0611	-0.1078
CATRC-GN	-0.0798	-0.0758	-0.0782	0.0172	0.1300	-0.1145	-0.0491	0.1740	0.1139	-0.0376
RAPPL-GN	0.0055	0.1458	0.0744	0.0592	0.4173	-0.0503	-0.1770	-0.0578	-0.3199	0.0358
DECOD-GN	-0.1121	0.0545	0.0670	0.1055	0.0792	-0.1266	-0.2443	-0.0774	-0.0683	0.0185
RACH.-GN	-0.0137	0.2023	-0.1620	0.0497	0.0220	-0.1186	-0.0522	0.1707	0.1002	-0.0353
TOTRC-GN	-0.0329	0.1510	-0.0350	0.0567	0.3065	-0.1406	-0.1362	0.1074	-0.1057	0.0310

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Grade 5 Reading (continued)

	APPLE-38	APPLE-39	APPLE-40	APPLE-41	APPLE-42	APPLE-43	APPLE-44	APPLE-45	APPLE-46	APPLE-47
WD-----1	0.1494	-0.1996	-0.1120	-0.0593	-0.2054	0.0460	-0.0809	-0.1167	-0.0750	-0.0039
WC-----2	0.4612	0.1405	0.0079	0.1303	0.0180	0.1770	0.0879	0.4166	-0.1613	0.3057
WC-----3	0.2137	-0.0182	-0.0170	-0.0659	-0.0038	0.0112	-0.1243	-0.1735	-0.0229	-0.1125
WC-----4	0.1761	0.1107	0.3031	0.0655	-0.0635	0.0930	0.0018	-0.2542	-0.1049	0.0092
WC-----5	0.1941	0.0806	-0.0213	0.0374	-0.0506	0.0996	-0.0033	0.0036	-0.2117	-0.1661
WD-----6	0.2776	0.0961	-0.1699	0.1559	-0.1116	0.0776	0.1008	-0.0717	0.1491	0.0883
WD-----7	-0.1381	-0.0759	-0.1792	-0.0485	-0.0195	-0.1228	-0.0058	-0.2316	0.0726	-0.0933
WC-----8	0.0787	-0.1257	-0.1631	-0.0060	0.2193	0.1842	0.0009	-0.2624	0.1428	-0.1508
WD-----9	0.1456	0.0343	0.0326	-0.3360	-0.0525	-0.0776	-0.0533	-0.0196	0.0514	0.0767
WD----10	-0.0300	-0.1278	0.0467	-0.1887	0.0869	0.0478	-0.2100	-0.2289	0.0344	0.0208
WD----11	-0.0024	-0.2407	-0.1585	-0.1970	-0.0647	-0.0960	0.0510	-0.1139	0.0625	-0.0563
WC----12	0.0624	-0.1968	-0.0617	-0.1992	-0.0536	-0.1127	0.0382	-0.1861	0.1492	0.0413
WD----13	-0.3068	0.0536	-0.0543	0.0216	-0.0036	-0.1326	-0.0977	-0.0324	-0.0763	-0.1069
WD----14	-0.2145	-0.2197	0.0589	0.1553	0.0553	-0.0853	-0.1080	0.0575	-0.2222	-0.0246
WD----15	-0.0148	0.1918	0.1400	-0.1270	-0.0482	0.1258	-0.0561	0.0144	-0.2121	0.1249
WD----16	-0.1165	0.0935	0.0785	0.0156	-0.0261	0.0452	0.1350	0.0012	-0.1686	-0.0009
WD----17	0.1928	-0.0137	-0.2001	0.1199	0.0224	0.0075	-0.0194	0.0207	0.1620	0.0732
WC----18	0.2082	0.0625	-0.1526	0.1901	0.0628	0.0272	0.0140	-0.1166	0.1953	0.1394
WD----19	0.2358	-0.1765	-0.1832	0.0214	0.1629	0.0407	-0.1071	0.0034	0.2606	0.0287
WD----20	0.1058	-0.1128	-0.1844	0.1540	0.1106	0.0421	-0.0138	0.0640	0.1902	-0.1763
WC----21	0.1815	0.1590	0.0299	-0.1455	-0.1663	0.0201	0.1175	0.1328	0.1729	0.1803
WC----22	0.1857	0.0390	-0.1026	-0.0722	-0.0904	-0.0323	0.1499	0.1605	0.1933	0.0525
WD----23	-0.2787	-0.1670	-0.0650	0.0254	0.2538	-0.2189	-0.0229	0.0856	0.0403	-0.1017
WC----24	0.1554	0.1453	-0.1013	-0.2342	-0.1975	0.3400	0.0430	0.1801	-0.2216	0.0399
WC----25	0.1817	-0.0705	0.1940	0.2199	0.0003	-0.0810	-0.0938	-0.0071	0.4753	-0.0288
WD----26	-0.0848	-0.0992	0.4802	0.0511	-0.1087	-0.0556	-0.0749	-0.1628	-0.0121	0.0969
WD----27	0.0680	-0.1826	-0.0001	-0.1812	0.0707	-0.0984	-0.0472	0.2372	0.2716	0.0820
WC----28	0.0491	-0.0191	-0.1574	0.0881	0.0430	0.1614	0.3712	-0.0288	0.0928	-0.0304
WD----29	0.0655	-0.0503	-0.1930	0.0438	0.0742	0.0947	0.3231	0.0329	0.1544	-0.0473
WC----30	-0.0153	-0.1693	-0.1568	0.1921	0.1610	-0.0743	0.0029	-0.0855	0.2770	-0.1685
WC----31	0.1582	-0.0767	-0.1184	-0.0724	0.1666	0.2432	0.3348	-0.0196	-0.1568	-0.0242
WD----32	0.2003	-0.1595	0.1462	-0.0307	-0.1859	-0.0191	-0.0190	0.0880	-0.0111	0.0605
WD----33	-0.1483	0.0110	-0.2776	0.0767	0.0047	-0.0741	-0.0128	-0.1058	-0.1118	-0.0467
WC----34	-0.1758	0.1929	-0.0070	0.1275	0.1534	0.1678	-0.0026	-0.2554	0.3119	0.1079

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Grade 5 Reading (continued)

	APPLE-38	APPLE-39	APPLE-40	APPLE-41	APPLE-42	APPLE-43	APPLE-44	APPLE-45	APPLE-46	APPLE-47
RAMOS--1	-0.1492	-0.1290	0.1932	-0.0377	0.0254	0.1516	-0.1544	-0.0935	0.0811	-0.0088
RAMOS--2	0.2689	-0.0918	0.3498	0.1043	0.0794	0.2180	-0.1417	-0.0430	0.0691	0.1689
RAMOS--3	-0.3982	-0.1077	-0.0717	-0.1115	-0.0569	-0.0078	-0.1009	-0.1918	0.0590	-0.0826
RAMOS--4	-0.0495	-0.0028	-0.1024	-0.0446	0.0640	-0.0791	-0.0968	0.2549	-0.0465	-0.1096
RAMOS--5	-0.1614	0.1966	-0.0797	-0.0993	-0.0766	-0.0245	0.3970	0.1111	-0.0629	-0.2457
RAMOS--6	-0.2263	-0.1564	-0.2075	0.1559	-0.0850	-0.1112	-0.0651	0.2204	-0.0813	-0.0924
RAMOS--7	0.1671	0.1011	0.3252	0.0924	0.0120	0.1615	-0.1838	-0.2263	0.0668	0.0086
RAMOS--8	0.0236	-0.1312	-0.2062	-0.1289	0.1039	0.2429	0.0520	0.1532	0.0860	0.1310
RAMOS--9	-0.1186	-0.0299	0.2229	0.1390	0.0307	0.2678	-0.1294	-0.1393	0.0999	-0.0515
RAMOS-10	-0.0792	-0.1116	-0.1511	-0.1608	0.1052	0.0640	-0.0447	0.1347	-0.0921	-0.0235
RAMOS-11	-0.1182	0.0559	-0.1448	-0.0409	0.0448	0.3169	0.0020	-0.1530	-0.1264	-0.0501
RAMOS-12	-0.0249	-0.1132	-0.1314	0.2225	-0.0695	-0.0647	-0.0277	0.0283	0.0543	-0.0925
RAMOS-13	0.1009	-0.0802	-0.0135	-0.1044	-0.1140	0.0174	-0.0417	0.2282	-0.1621	-0.1108
RAMOS-14	-0.0571	-0.0766	-0.1931	0.0937	0.1532	0.1918	-0.0246	0.1113	-0.2099	0.1352
RAMOS-15	-0.2253	0.1948	0.3171	0.0718	-0.0789	0.0931	-0.1037	-0.2889	-0.0436	-0.0853
RAMOS-16	0.2873	-0.1842	0.2258	0.2422	0.1762	0.1449	-0.0892	-0.0523	0.1763	0.0936
RAMOS-17	0.0147	-0.1770	-0.1183	0.0764	0.3848	0.0557	-0.0651	0.0041	0.3256	-0.0334
RAMOS-18	0.0723	-0.0633	-0.0259	-0.1348	-0.0648	-0.0743	-0.0683	0.1488	0.0761	-0.0270
RAMOS-19	-0.1682	-0.1747	-0.1278	-0.1334	-0.0303	0.0389	-0.0703	0.0588	0.3989	0.0228
RAMOS-20	-0.1277	-0.0373	-0.0469	-0.1359	0.1945	0.1419	-0.0458	-0.0561	-0.0247	0.0018

Grade 5 Reading (continued)

	APPLE-38	APPLE-39	APPLE-40	APPLE-41	APPLE-42	APPLE-43	APPLE-44	APPLE-45	APPLE-46	APPLE-47
APPLE--1	-0.0361	-0.0533	0.0000	-0.0459	0.2908	-0.0510	-0.0224	-0.1345	0.3309	0.0400
APPLE--2	0.0783	0.0266	-0.1616	-0.0205	0.0189	0.1003	-0.1153	0.1869	0.0441	0.0315
APPLE--3	-0.1545	-0.1426	-0.2072	0.0076	-0.0711	0.1418	-0.0955	0.0345	0.2647	0.0668
APPLE--4	0.0164	-0.0388	-0.0442	0.0109	-0.1839	-0.1032	-0.0138	0.1259	-0.2758	-0.0741
APPLE--5	-0.0496	0.1248	-0.0642	-0.0863	-0.0145	0.1672	0.3178	-0.2089	0.1294	0.1501
APPLE--6	0.2050	-0.0633	-0.0494	-0.0786	0.4314	0.4467	-0.0724	-0.0095	0.1432	0.1041
APPLE--7	-0.2225	-0.0437	-0.1529	0.2392	0.0267	-0.1608	0.1184	0.1713	-0.1282	0.1584
APPLE--8	0.1907	-0.0195	-0.0420	-0.0281	-0.1653	-0.1422	-0.1237	0.3661	-0.1271	-0.1777
APPLE--9	-0.1349	-0.1010	0.3043	0.0419	0.4420	-0.0768	0.0550	-0.0267	-0.1105	-0.2014
APPLE-10	0.2467	-0.1496	0.3471	-0.0344	0.0295	0.0178	-0.1698	0.0509	-0.1132	-0.0303
APPLE-11	-0.1228	-0.1962	0.1347	0.0041	0.0196	0.0032	-0.1065	0.0850	-0.0802	-0.2712
APPLE-12	0.0502	0.2405	-0.0184	-0.1729	-0.1068	-0.0052	-0.1282	0.1209	0.0242	0.1266
APPLE-13	0.1021	0.0267	0.0679	-0.1617	-0.0113	-0.0777	0.3577	0.1697	-0.1191	0.0428
APPLE-14	-0.0731	0.3248	-0.0991	-0.0992	-0.1713	-0.1095	0.1676	0.1210	-0.1216	-0.1752
APPLE-15	0.4266	-0.0810	0.2955	0.0028	-0.0078	0.1547	-0.1486	0.1538	0.4352	0.3387
APPLE-16	0.2133	0.0148	0.1381	0.2087	-0.0801	0.0918	-0.0617	-0.0968	0.2985	0.3897
APPLE-17	0.2098	-0.1590	-0.0531	-0.1136	-0.0028	0.3837	-0.0368	0.2243	0.1822	-0.0677
APPLE-19	-0.4467	-0.0007	0.1722	-0.0672	-0.2237	-0.3523	-0.0462	0.0310	-0.2378	-0.1354
APPLE-20	0.5994	-0.1283	-0.1346	0.0598	0.0071	0.1885	0.1428	0.3446	-0.0918	0.0516
APPLE-21	-0.1365	-0.1000	0.2570	0.0225	0.0360	-0.1235	-0.0614	0.0219	-0.0832	-0.0775
APPLE-22	-0.3534	0.1341	-0.0195	-0.0739	0.2135	-0.1560	0.1177	-0.1865	0.4459	-0.1362
APPLE-23	0.4728	0.0939	-0.0149	-0.0940	0.0456	0.4592	-0.0926	0.1385	0.1153	0.4061
APPLE-24	0.0028	-0.0754	-0.0678	-0.0954	-0.1399	-0.1333	-0.1131	0.0895	0.2708	-0.1422
APPLE-25	-0.3074	-0.1088	-0.1196	-0.0873	-0.1306	-0.1928	-0.0431	-0.0915	-0.1370	-0.1779
APPLE-26	0.3109	-0.0850	0.0056	-0.1821	0.3908	0.3286	-0.1026	0.0158	0.2346	0.2599
APPLE-27	-0.2982	-0.0497	0.0948	0.1019	-0.1046	-0.1938	-0.0179	0.0069	-0.1794	-0.0161
APPLE-28	0.0484	0.5796	-0.0876	-0.1185	-0.0145	0.0193	-0.0719	0.0348	-0.1216	-0.0669
APPLE-29	-0.2062	0.1334	0.1084	0.0093	-0.0825	-0.1749	0.0129	-0.0025	-0.0145	-0.0485
APPLE-30	-0.3270	0.0340	-0.1027	0.2756	-0.1008	-0.2368	-0.0278	-0.0529	-0.0681	-0.1445

Grade 5 Reading (continued)

	APPLE-38	APPLE-39	APPLE-40	APPLE-41	APPLE-42	APPLE-43	APPLE-44	APPLE-45	APPLE-46	APPLE-47
APPLE-31	-0.0454	-0.0602	0.0065	-0.0859	0.0932	-0.0723	-0.0852	0.1190	0.0148	0.0175
APPLE-32	-0.1334	-0.0468	-0.0166	-0.1694	-0.0272	-0.0035	-0.0483	0.1683	-0.0563	-0.0943
APPLE-33	-0.2819	-0.0183	-0.0375	0.3562	0.0881	-0.2288	0.0003	0.0713	0.0722	-0.0455
APPLE-34	-0.0872	0.6277	-0.1725	-0.1879	-0.0617	0.2252	0.1350	-0.0032	-0.1858	-0.0893
APPLE-35	0.0199	0.0237	0.1813	0.0280	-0.0883	0.1144	0.0986	-0.1101	0.4081	0.0248
APPLE-36	-0.0759	-0.1087	-0.1164	-0.0478	-0.1113	0.2299	-0.0917	0.1434	0.3674	-0.0849
APPLE-37	-0.2014	0.0866	0.4455	-0.1960	-0.0351	0.0461	-0.0418	0.1173	-0.0558	-0.1333
APPLE-38	1.0000	-0.0719	0.1307	0.0070	0.0989	0.4019	-0.1042	0.2615	0.0955	0.3783
APPLE-39	-0.0719	1.0000	-0.0132	-0.0427	-0.0600	-0.1080	0.2797	-0.1554	-0.1230	-0.0141
APPLE-40	0.1307	-0.0132	1.0000	0.0712	0.0605	0.0196	-0.0662	-0.0639	0.0959	0.1539
APPLE-41	0.0070	-0.0427	0.0712	1.0000	-0.0459	-0.2052	0.0009	-0.0561	0.1783	0.0416
APPLE-42	0.0989	-0.0600	0.0605	-0.0459	1.0000	0.1632	-0.1174	-0.1199	0.0973	-0.0269
APPLE-43	0.4019	-0.1080	0.0196	-0.2052	0.1632	1.0000	-0.1301	-0.0062	-0.0078	0.2651
APPLE-44	-0.1042	0.2797	-0.0662	0.0009	-0.1174	-0.1301	1.0000	-0.1262	-0.0964	-0.0438
APPLE-45	0.2615	-0.1554	-0.0639	-0.0561	-0.1199	-0.0062	-0.1262	1.0000	-0.0554	-0.0584
APPLE-46	0.0955	-0.1230	0.0959	0.1783	0.0973	-0.0078	-0.0964	-0.0554	1.0000	0.0060
APPLE-47	0.3783	-0.0141	0.1539	0.0416	-0.0269	0.2651	-0.0438	-0.0584	0.0060	1.0000
APPLE-48	0.1339	0.0185	0.1339	0.2809	0.1348	0.0476	0.0504	-0.1603	0.1128	-0.0142
APPLE-49	-0.0727	0.0678	-0.0730	0.0837	-0.1605	0.1273	0.2105	-0.1243	-0.0616	0.1639
APPLE-50	-0.1674	0.0714	0.2012	0.0774	-0.1152	-0.0957	0.5563	-0.0675	-0.0567	-0.1663
CATRC-GN	0.0557	-0.1171	-0.0020	-0.1664	0.1725	0.0311	-0.0100	0.0752	0.1804	0.0352
RAPPL-GN	-0.0562	0.0332	-0.1056	-0.0710	-0.0177	-0.2110	-0.1261	0.0657	-0.1398	0.2085
CECOD-GN	0.1974	-0.0104	0.0212	-0.0082	-0.0880	-0.2120	0.0663	0.1180	-0.0668	0.0740
RACH.-GN	-0.0934	-0.0861	0.2119	-0.1362	-0.1004	-0.0527	-0.0867	0.0532	-0.1109	0.1679
TOTRD-GN	-0.1116	-0.0734	0.0588	-0.1652	0.0049	-0.1358	-0.1222	0.0316	-0.0971	0.2207

Grade 5 Reading (continued)

	APPLE-48	APPLE-49	APPLE-50	CATRC-GN	RAPPL-GN	DECOD-GN	RACH.-GN	TOTRD-GN
WD-----1	0.0486	-0.0104	-0.2710	-0.2905	0.2822	0.2857	-0.0244	0.0648
WD-----2	-0.0515	0.0830	-0.1147	-0.0627	0.0841	0.0703	-0.0594	-0.0264
WD-----3	0.0399	-0.0755	-0.0995	-0.4191	-0.1902	0.0486	-0.2393	-0.3919
WD-----4	0.0478	-0.0111	-0.1347	-0.3487	0.1003	0.1717	-0.2519	-0.1817
WD-----5	-0.1149	0.0779	0.0751	0.0072	-0.1774	-0.2264	-0.1451	-0.1938
WD-----6	0.0456	0.1761	-0.1400	-0.0958	-0.0889	-0.2059	-0.0650	-0.1580
WD-----7	-0.1371	-0.1919	-0.2435	0.0473	0.1286	0.1006	-0.0826	0.0397
WD-----8	0.0473	-0.1199	-0.1903	0.1859	0.0519	0.1422	-0.0297	0.0611
WD-----9	0.0471	-0.0660	-0.1561	-0.0757	-0.0023	0.1654	0.0638	-0.0018
WD----10	-0.0223	-0.2398	-0.2021	-0.0808	0.1961	0.0919	0.2227	0.2148
WD----11	0.1867	0.0592	0.0376	0.0332	0.0068	-0.1081	-0.0246	0.0127
WD----12	0.0695	0.0387	-0.0426	0.1181	0.0223	0.0133	0.0077	0.0631
WD----13	-0.2218	0.2660	-0.0397	-0.0980	-0.0412	-0.0979	-0.0168	-0.0787
WD----14	-0.0540	0.1243	0.0155	-0.0088	-0.1593	-0.2694	-0.0150	-0.0991
WD----15	-0.0496	0.3319	0.0696	-0.0631	-0.0332	-0.0746	0.0305	-0.0339
WD----16	-0.0085	0.3079	0.0925	-0.0784	-0.0471	-0.0148	-0.0398	-0.0901
WD----17	0.0156	-0.1656	-0.2513	0.1261	0.2246	0.2562	-0.0569	0.1541
WD----18	0.0301	-0.1472	-0.2104	0.0386	0.1878	0.1989	-0.0418	0.0975
WD----19	0.0012	-0.1477	-0.2800	0.1477	0.1693	0.1644	-0.1493	0.0781
WD----20	0.1381	-0.2004	-0.1884	0.1589	0.1617	0.3020	-0.0718	0.0998
WD----21	0.0398	0.1578	-0.0919	-0.0321	-0.0319	0.0808	-0.0459	-0.1031
WD----22	0.0406	0.1845	-0.1327	0.1043	0.0160	0.1677	-0.3028	-0.1345
WD----23	-0.0915	-0.0136	-0.0080	0.2390	0.3095	0.0049	0.0651	0.2969
WD----24	-0.2163	0.1029	0.0141	-0.1275	-0.2680	-0.1558	0.0242	-0.1628
WD----25	0.2359	-0.0707	-0.1440	-0.1469	0.0083	0.2569	-0.2658	-0.1878
WD----26	0.0432	-0.1105	0.0770	0.0337	0.1320	-0.0573	0.1062	0.1441
WD----27	-0.0928	-0.2723	-0.0792	0.1955	0.0671	0.1289	0.2022	0.1844
WD----28	0.0030	-0.1150	0.0602	0.1217	0.0816	0.0767	0.0241	0.0788
WD----29	-0.0099	-0.1595	0.0351	0.1873	0.1033	0.1509	0.0332	0.1289
WD----30	0.0078	-0.1672	-0.1563	0.1564	0.1124	0.0969	0.0361	0.1132
WD----31	0.0409	-0.0904	0.1233	0.0149	0.1083	0.2546	-0.1412	0.0027
WD----32	0.0555	-0.2923	0.0585	0.0544	0.1351	0.2285	0.2015	0.2279
WD----33	-0.0815	0.0556	-0.1199	-0.0798	0.0798	0.0993	-0.3660	-0.0976
WD----34	-0.2458	0.0369	0.1393	0.0609	-0.1565	-0.2747	-0.1114	-0.1203

Grade 5 Reading (continued)

	APPLE-48	APPLE-49	APPLE-50	CATRC-GN	RAPPL-GN	DECOD-GN	RACH.-GN	TOTRD-GN
RAMOS--1	-0.0795	-0.1970	-0.0082	-0.1162	-0.0593	0.0793	0.0666	0.0058
RAMOS--2	0.0736	-0.1516	-0.0805	-0.0824	-0.0679	0.2869	0.1378	-0.0088
RAMOS--3	-0.1412	-0.0461	-0.0190	0.1272	0.0724	-0.1659	-0.0465	0.1277
RAMOS--4	-0.0578	-0.0937	0.0428	-0.2971	-0.0542	-0.0868	0.1187	-0.0878
RAMOS--5	-0.0339	0.0091	0.3057	-0.2853	-0.2153	0.0011	-0.2408	-0.3224
RAMOS--6	-0.1173	0.1780	-0.0430	0.0616	-0.1804	-0.1948	-0.0019	-0.0522
RAMOS--7	0.0799	-0.0528	0.0125	-0.1788	-0.1422	0.0430	-0.2572	-0.2393
RAMOS--8	0.0228	0.1119	-0.0556	0.1087	0.1958	0.0428	-0.1088	0.0926
RAMOS--9	0.0270	-0.0481	-0.0058	-0.0187	-0.2160	-0.2265	-0.0769	-0.1163
RAMOS-10	0.0528	-0.1134	-0.0162	-0.1650	-0.1311	0.0018	0.0129	-0.1302
RAMOS-11	0.1248	0.0895	-0.1397	-0.1121	-0.1138	-0.0690	-0.1273	-0.1374
RAMOS-12	0.1262	0.1750	0.1408	0.0070	-0.2800	-0.3514	-0.0272	-0.1676
RAMOS-13	-0.0239	0.0653	0.0453	0.0092	-0.2847	-0.0024	0.0348	-0.1986
RAMOS-14	-0.0829	0.0474	0.0016	0.1169	0.0699	-0.2518	0.0333	0.1412
RAMOS-15	0.1153	0.0078	-0.0255	-0.1848	-0.0338	-0.0453	-0.0486	-0.0447
RAMOS-16	0.1082	-0.2809	-0.0028	0.0268	-0.1321	0.0817	-0.0959	-0.1548
RAMOS-17	0.1335	0.0211	-0.0693	0.0211	-0.0006	-0.1934	-0.1083	-0.0342
RAMOS-18	-0.0507	-0.1341	-0.0506	0.0662	0.1120	0.2910	0.2384	0.2189
RAMOS-19	-0.1297	-0.1934	-0.1565	0.1497	0.0142	-0.0376	-0.0159	0.0527
RAMOS-20	-0.0968	-0.0817	0.0191	-0.0969	-0.0690	-0.0276	-0.0207	-0.0601

Grade 5 Reading (continued)

	APPLE-48	APPLE-49	APPLE-50	CATRC-GN	RAPPL-GN	DECOD-GN	RACH.-GN	TOTRD-GN
APPLE--1	0.1867	-0.0844	-0.1320	0.2446	-0.0474	-0.2770	0.0527	0.0811
APPLE--2	0.0610	-0.1732	-0.0135	0.2398	0.1438	0.0677	0.2608	0.2892
APPLE--3	-0.1425	0.2967	-0.1488	0.0859	-0.1979	-0.1022	-0.0875	-0.1526
APPLE--4	0.0843	-0.0320	-0.2228	-0.1932	0.3094	0.2797	0.0365	0.1294
APPLE--5	-0.0225	0.4969	0.0881	-0.0297	-0.2281	0.0177	-0.1133	-0.2071
APPLE--6	0.0382	0.2770	-0.0980	0.1076	-0.1387	-0.1913	-0.0590	-0.1114
APPLE--7	-0.2961	0.1539	0.1193	0.1541	0.0606	-0.0567	0.0024	0.0847
APPLE--8	-0.1008	-0.0801	0.0682	-0.1705	-0.1248	-0.1161	0.0452	-0.1742
APPLE--9	0.0091	-0.1409	0.4076	-0.0686	-0.2826	-0.1757	0.0390	-0.1472
APPLE-10	0.0226	-0.2085	0.0697	-0.1002	-0.2532	-0.0720	0.1101	-0.1284
APPLE-11	-0.0216	-0.0054	-0.0096	-0.0679	-0.1121	-0.0224	-0.1031	-0.1179
APPLE-12	-0.1670	-0.1106	-0.0672	-0.0582	0.1180	0.0771	-0.1834	-0.0356
APPLE-13	-0.0959	-0.0272	0.2861	0.0328	0.0498	0.3536	0.2642	0.1321
APPLE-14	-0.0232	-0.0499	0.1351	-0.0901	0.0531	0.1069	-0.2059	-0.1148
APPLE-15	0.0416	0.0111	-0.2632	0.2058	0.1043	0.2190	0.1704	0.1705
APPLE-16	-0.0268	-0.0890	0.1382	-0.1989	-0.0851	-0.0810	-0.0297	-0.1298
APPLE-17	0.0192	-0.0475	-0.1372	0.0517	0.0224	-0.1287	-0.1061	-0.0644
APPLE-19	-0.0420	-0.0204	-0.0143	-0.1792	0.0809	-0.0343	0.1880	0.0826
APPLE-20	0.0347	-0.1874	-0.0407	-0.1889	0.0070	0.2698	-0.1159	-0.1550
APPLE-21	-0.0577	0.0802	0.3875	0.1384	-0.1374	-0.0693	0.0646	-0.0226
APPLE-22	0.2051	-0.0261	0.0729	0.1652	-0.0763	-0.3156	0.0716	0.0529
APPLE-23	-0.1122	0.1616	-0.1663	0.0821	0.0212	0.1097	-0.0267	-0.0179
APPLE-24	-0.1446	-0.1940	-0.0596	0.0941	-0.2260	0.0282	-0.0597	-0.1832
APPLE-25	-0.0824	-0.1738	-0.1401	-0.2593	0.0143	0.1293	0.1332	-0.0211
APPLE-26	0.2621	0.2365	-0.1752	0.1656	0.0405	-0.0113	-0.0111	0.0656
APPLE-27	-0.1148	0.0735	0.3124	0.0266	0.0232	-0.1877	0.1824	0.1080
APPLE-28	-0.0133	-0.1992	-0.0977	-0.0798	0.0055	-0.1121	-0.0137	-0.0329
APPLE-29	0.1171	0.1006	-0.0455	-0.0758	0.1458	0.0545	0.2023	0.1510
APPLE-30	-0.1876	0.1367	0.0919	-0.0782	0.0744	0.0670	-0.1620	-0.0350

Grade 5 Reading (continued)

	APPLE-48	APPLE-49	APPLE-50	CATRC-GN	RAPPL-GN	DECOD-GN	RACH.-GN	TOTRD-GN
APPLE-31	-0.0850	-0.0544	0.1091	0.0172	0.0592	0.1055	0.0497	0.0567
APPLE-32	-0.0758	-0.0107	0.0564	0.1300	0.4173	0.0792	0.0220	0.3065
APPLE-33	0.1352	-0.0660	-0.0151	-0.1145	-0.0503	-0.1266	-0.1186	-0.1406
APPLE-34	0.0308	0.0755	0.0439	-0.0491	-0.1770	-0.2443	-0.0522	-0.1362
APPLE-35	0.5311	0.0381	0.0108	0.1740	-0.0578	-0.0774	0.1707	0.1074
APPLE-36	-0.0297	0.0006	-0.0611	0.1139	-0.3199	-0.0683	0.1002	-0.1057
APPLE-37	-0.0939	-0.1890	-0.1078	-0.0376	0.0358	0.0185	-0.0353	0.0310
APPLE-38	0.1339	-0.0727	-0.1674	0.0557	-0.0562	0.1974	-0.0934	-0.1116
APPLE-39	0.0185	0.0678	0.0714	-0.1171	0.0332	-0.0104	-0.0861	-0.0734
APPLE-40	0.1339	-0.0730	0.2012	-0.0020	-0.1056	0.0212	0.2119	0.0588
APPLE-41	0.2809	0.0837	0.0774	-0.1664	-0.0710	-0.0082	-0.1362	-0.1652
APPLE-42	0.1348	-0.1605	-0.1152	0.1725	-0.0177	-0.0880	-0.1004	0.0049
APPLE-43	0.0476	0.1273	-0.0957	0.0311	-0.2110	-0.2120	-0.0527	-0.1358
APPLE-44	0.0504	0.2105	0.5563	-0.0100	-0.1261	0.0663	-0.0867	-0.1222
APPLE-45	-0.1603	-0.1243	-0.0675	0.0752	0.0657	0.1180	0.0532	0.0316
APPLE-46	0.1128	-0.0616	-0.0567	0.1804	-0.1398	-0.0668	-0.1109	-0.0971
APPLE-47	-0.0142	0.1639	-0.1663	0.0352	0.2085	0.0740	0.1679	0.2207
APPLE-48	1.0000	0.0790	0.0077	-0.2121	-0.0167	0.0845	0.0611	-0.0181
APPLE-49	0.0790	1.0000	0.1979	-0.0890	-0.1224	-0.1510	-0.1944	-0.1867
APPLE-50	0.0077	0.1979	1.0000	-0.0102	-0.2968	-0.1321	0.0504	-0.1577
CATRC-GN	-0.2121	-0.0890	-0.0102	1.0000	0.1780	-0.0510	0.0978	0.4971
RAPPL-GN	-0.0167	-0.1224	-0.2968	0.1780	1.0000	0.4327	0.2221	0.7842
DECOD-GN	0.0845	-0.1510	-0.1321	-0.0510	0.4327	1.0000	0.1047	0.2886
RACH.-GN	0.0611	-0.1944	0.0504	0.0978	0.2221	0.1047	1.0000	0.6579
TOTRD-GN	-0.0181	-0.1867	-0.1577	0.4971	0.7842	0.2886	0.6579	1.0000

Correlations Among the Basic Components of the Teaching Performance Variables and the Pupil Achievement Tests
Grade 2 Math

PTES GRADE 2 MATH

	WC-----1	WC-----2	WC-----3	WD-----4	WD-----5	WD-----6	WD-----7	WC-----8	WD-----9	WD----10
WD-----1	1.0000	0.4741	-0.0590	0.3579	0.3533	-0.0896	0.2796	0.1201	0.0916	0.3075
WC-----2	0.4741	1.0000	0.3762	0.6587	0.4092	-0.1844	0.1732	0.0957	0.1182	0.2982
WC-----3	-0.0590	0.3762	1.0000	0.0303	0.0007	-0.0449	0.1346	0.2520	0.0211	0.2964
WC-----4	0.3579	0.6587	0.0303	1.0000	-0.0375	-0.1568	0.1909	-0.0310	0.0201	-0.1174
WC-----5	0.3533	0.4092	0.0007	-0.0375	1.0000	-0.1183	-0.0229	0.0448	0.1027	0.2338
WC-----6	-0.0896	-0.1844	-0.0449	-0.1568	-0.1183	1.0000	0.7114	0.0097	-0.2974	-0.0735
WC-----7	0.2796	0.1732	0.1346	0.1909	-0.0229	0.7114	1.0000	0.1192	-0.1749	0.0867
WC-----8	0.1201	0.0957	0.2520	-0.0310	0.0448	0.0097	0.1192	1.0000	0.3880	0.6002
WC-----9	0.0916	0.1182	0.0211	0.0201	0.1027	-0.2974	-0.1749	0.3880	1.0000	0.3992
WC----10	0.3075	0.2982	0.2964	-0.1174	0.2338	-0.0735	0.0867	0.6002	0.3992	1.0000
WC----11	-0.0967	-0.0059	0.2221	-0.0373	-0.2727	-0.0459	-0.0563	-0.1389	-0.2004	-0.0602
WC----12	-0.0532	-0.0042	0.3004	-0.0357	-0.1414	0.0543	0.0763	-0.0429	-0.1103	0.0021
WC----13	-0.1223	-0.1611	-0.0032	-0.2635	-0.0385	-0.0509	-0.1170	-0.1589	-0.2804	-0.1264
WD----14	0.3256	0.1846	0.0943	0.1818	0.0293	0.1393	0.6098	0.2931	0.1344	0.1440
WD----15	0.4330	0.2145	0.1226	0.1627	0.1085	0.1356	0.4196	0.3117	0.0178	0.2439
WC----16	0.2704	0.0492	0.1021	-0.0198	0.0697	0.1485	0.5326	0.2440	0.0034	0.1884
WD----17	-0.2415	-0.1281	0.2540	-0.2471	0.0821	-0.2112	-0.3624	0.2849	0.1074	0.2861
WC----18	-0.0169	0.0927	0.3164	-0.0716	0.0711	-0.1414	-0.1487	0.0474	0.1922	0.1641
WC----19	-0.2320	-0.1990	-0.1330	0.1098	-0.2964	-0.3759	-0.3037	-0.0351	-0.1638	-0.2654
WC----20	0.0726	0.1094	0.1395	-0.0108	0.1014	0.1200	0.1153	-0.1403	-0.0780	-0.1484
WD----21	-0.0530	0.1683	-0.1071	0.0426	0.2460	0.0769	0.1695	-0.3769	-0.0847	-0.3082
WC----22	0.1065	0.0824	0.1829	-0.1098	0.0456	0.0120	0.1382	0.1637	0.2809	0.2911
WC----23	-0.0482	-0.3360	-0.1857	-0.0684	-0.1621	-0.2182	-0.0680	0.1225	-0.0036	-0.1778
WC----24	0.2762	-0.0026	0.1003	0.0352	0.0429	0.0834	0.3814	0.0555	0.1515	0.1273
WC----25	0.3127	0.1788	0.0418	0.2966	-0.1953	0.3633	0.6205	0.0488	-0.1077	0.1957
WD----26	0.1927	0.1822	0.2508	0.1256	-0.0390	0.1793	0.4351	0.2946	-0.0728	0.2163
WC----27	0.4751	0.3341	0.1888	0.3055	-0.0658	0.1280	0.4006	-0.0009	-0.0723	0.2184
WC----28	0.0986	0.0373	-0.1883	0.1932	0.2026	-0.5075	-0.5245	-0.1693	-0.2028	-0.1625
WC----29	0.0873	0.0142	0.2595	0.0481	0.0266	0.2848	0.4512	-0.0561	0.0045	-0.0342
WC----30	-0.1650	0.0227	0.1900	-0.0349	-0.0725	0.0752	0.0351	0.1709	-0.1476	0.0620

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Grade 2 Math (continued)

	WD-----1	WD-----2	WD-----3	WD-----4	WD-----5	WD-----6	WD-----7	WD-----8	WD-----9	WD----10
RAMCS--1	C.2163	0.1036	-0.1792	-0.1166	0.2676	0.0193	0.0885	-0.0961	-0.2779	0.0510
RAMCS--2	-C.CC50	-0.0265	-0.1898	-0.2156	0.2595	0.1483	-0.0262	-0.0541	-0.2812	0.0372
RAMCS--3	C.3274	C.2379	0.0296	0.0710	0.1200	-0.0794	0.1241	-0.0632	-0.0310	0.1036
RAMCS--4	-0.0715	-C.1844	-0.2064	-0.C001	-0.0482	-0.1021	0.0391	-0.0326	-0.1114	-0.0903
RAMOS--5	C.C853	0.2C19	0.3097	-C.0282	-0.1575	-0.0580	0.1015	0.0413	-0.0623	-0.0110
RAMOS--6	0.0801	C.C580	-0.1183	0.1074	-C.1675	-0.0954	-0.1908	-0.1061	-0.0808	0.0498
RAMOS--7	C.C813	0.0228	-0.1600	0.0461	0.1366	0.1339	0.1390	-0.0946	-0.2552	-0.0087
RAMCS--8	0.1741	C.1261	-0.1889	0.0052	C.0837	-0.2088	-0.2085	-0.1032	-0.1717	-0.0638
RAMOS--9	0.2446	0.0539	-0.1748	C.1600	0.03C6	0.0558	0.1565	-0.1031	-0.3175	0.0103
RAMOS-10	0.01C5	C.1572	0.1289	0.0422	-0.0184	-0.2813	-0.3017	-0.0056	-0.1686	-0.0505
RAMOS-11	0.1038	C.13C5	0.1441	0.0574	-0.1111	-0.0918	-0.1098	-0.0237	-0.1368	0.1467
RAMCS-12	-0.1981	-0.2303	-0.2425	-C.2476	C.1184	0.1115	0.0830	-0.1578	-0.2723	-0.0555
RAMOS-13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RAMOS-14	-0.C873	-C.1074	-0.2764	-0.3599	0.1952	0.1841	-0.0415	-0.3534	-0.3937	-0.0807
RAMCS-15	C.2874	C.11C4	-0.0935	C.2399	-0.0289	0.0207	0.0935	-0.2164	-0.2497	-0.0543
RAMOS-16	0.1435	C.1527	0.0082	-0.0119	0.2224	-0.0744	-0.1091	0.2061	0.2957	0.2914
RAMOS-17	-C.1124	0.0290	-0.0355	0.0217	0.1502	-0.2042	-0.1626	0.3102	0.2065	0.1904
RAMCS-18	0.0485	C.0645	0.0987	C.1221	-0.0985	0.2729	0.2720	0.1558	-0.1301	-0.0224
RAMOS-19	0.0626	0.0711	0.2197	-0.1238	-0.0743	-0.0349	0.0755	0.0630	-0.0892	-0.0841
RAMOS-20	C.2930	-C.2567	-0.3437	0.0256	0.0268	-0.1549	0.0158	0.0607	0.0785	-0.0997

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	WD-----1	WD-----2	WD-----3	WD-----4	WD-----5	WD-----6	WD-----7	WD-----8	WD-----9	WD----10
APPLE--1	-0.1201	-0.0819	-0.1181	-0.3317	0.1842	0.4028	0.2185	-0.2011	-0.4230	0.0152
APPLE--2	0.0429	0.1560	0.0242	0.0926	0.1359	0.0048	0.0181	0.2725	0.1174	0.2575
APPLE--3	-0.2100	-0.2383	0.1023	-0.0443	-0.2966	0.0854	-0.0786	0.1262	-0.2161	-0.0702
APPLE--4	-0.1409	-0.2166	0.0139	-0.1846	-0.2921	0.1210	-0.0893	0.1742	0.1215	0.0377
APPLE--5	0.1132	-0.1181	-0.1793	-0.0291	-0.1796	-0.0714	-0.0945	0.3273	0.1430	0.1844
APPLE--6	-0.1902	0.0064	-0.0897	0.0302	0.1320	-0.2311	-0.2571	0.1927	-0.0112	0.0799
APPLE--7	0.5524	-0.0333	-0.3137	0.1381	0.0033	0.2996	0.3586	-0.1437	-0.1655	-0.1639
APPLE--8	-0.2177	-0.2575	0.0897	-0.1535	-0.1546	0.0888	-0.0130	0.1656	0.0098	-0.1286
APPLE--9	0.0016	-0.0341	-0.0511	-0.1281	0.1932	0.0125	0.0653	0.1537	-0.3170	0.0735
APPLE-10	0.0893	0.1429	0.2712	0.0359	0.0777	0.1302	0.0863	-0.2646	-0.2420	-0.1480
APPLE-11	-0.2397	0.0763	0.1345	0.0002	-0.0168	-0.2302	-0.2683	-0.2064	0.2186	-0.0002
APPLE-12	-0.1091	0.0687	0.2064	0.1409	-0.2190	-0.1710	-0.1748	-0.0564	0.0162	0.0100
APPLE-13	0.2221	0.0786	0.1175	-0.0052	-0.0232	-0.1742	0.1308	0.0353	0.0822	0.2834
APPLE-14	0.4098	-0.0889	-0.2062	-0.2290	0.2598	0.1913	0.1501	-0.3202	-0.0528	-0.1100
APPLE-15	0.0334	0.1705	-0.0225	0.1244	0.1128	-0.3220	-0.1797	0.1768	0.2166	0.0918
APPLE-16	-0.1535	0.1589	-0.1192	0.2834	0.0480	-0.1200	-0.0099	0.0169	0.1029	-0.3075
APPLE-17	0.0861	0.2473	-0.1392	-0.0024	-0.0398	-0.1493	-0.1586	-0.0021	0.2763	0.2260
APPLE-19	-0.0892	-0.2922	-0.1346	-0.0999	0.0083	-0.1570	-0.1488	-0.0366	0.0813	-0.0601
APPLE-20	-0.1011	0.0057	0.0881	-0.1159	0.0890	0.2368	0.0148	-0.2650	-0.1883	-0.2673
APPLE-21	-0.0403	-0.0232	0.2571	-0.1385	-0.2353	0.0349	-0.0110	0.1660	0.1585	0.1689
APPLE-22	0.0547	0.0902	-0.0763	0.2381	-0.1009	-0.2626	-0.0558	0.2828	-0.1282	0.1972
APPLE-23	-0.2962	0.1671	0.0561	-0.1622	0.1066	0.1189	-0.0993	-0.0474	0.2893	0.0528
APPLE-24	0.0782	0.0975	0.2223	-0.0128	-0.1670	-0.0635	0.1783	0.1725	0.1887	0.1151
APPLE-25	-0.0675	0.0168	0.0450	-0.1043	0.1368	0.0677	-0.0153	0.2104	0.2935	0.2094
APPLE-26	-0.0179	0.0160	0.0245	-0.0152	0.0218	0.0422	0.1971	0.3936	-0.1030	0.2876
APPLE-27	0.2380	0.0436	-0.0454	0.0030	0.1094	-0.0968	-0.1386	0.1390	-0.0264	0.2200
APPLE-28	0.0862	0.2780	0.0498	0.2116	0.2635	-0.1623	-0.0898	0.1902	0.1026	0.2049
APPLE-29	-0.0191	-0.1797	-0.2419	-0.1419	-0.1373	-0.1839	-0.2275	0.0232	-0.2024	-0.1232
APPLE-30	0.6695	0.3214	-0.1373	0.3521	0.1587	0.1339	0.3246	0.1031	-0.0350	0.0548

Grade 2 Math (continued)

	WC-----1	WC-----2	WC-----3	WD-----4	WD-----5	WD-----6	WD-----7	WC-----8	WD-----9	WD----10
APPLE-31	-C.0973	-C.1951	-0.2180	-0.0343	-0.1287	-0.0770	-0.1036	-0.3568	-0.1089	-0.1963
APPLE-32	-C.C919	C.CCCO	-0.0815	-0.0143	0.0015	-0.1683	-0.1673	0.0634	-0.1091	-0.0171
APPLE-33	0.0962	-0.1425	-0.1959	-0.1618	C.1260	0.2763	0.2077	-0.4160	-0.0899	-0.1473
APPLE-34	-C.C691	-C.1954	-0.3208	-0.1544	0.0220	0.2650	0.0499	0.1765	-0.1476	0.0380
APPLE-35	-C.1313	-0.1046	-0.1470	-C.0663	0.0177	0.0163	0.1064	0.3610	0.0925	0.2722
APPLE-36	-0.1509	-C.2C85	-0.2483	-C.2534	C.2048	0.1609	0.0034	-0.1130	-0.3941	-0.1176
APPLE-37	-C.2250	-C.1255	0.0274	-0.1288	-0.0626	-0.1029	-0.1829	0.0922	-0.1345	-0.1419
APPLE-38	-0.22C8	-C.0147	0.0269	-0.1942	-0.0555	-0.0532	-0.0793	-0.0008	0.3256	0.0268
APPLE-39	-0.1860	C.C085	0.0135	-0.1584	C.CC86	0.2650	0.0910	0.1464	0.2186	0.1510
APPLE-40	-C.1415	C.0112	0.0479	-0.0880	0.0725	-0.1454	-0.2190	-0.0774	-0.0175	0.0371
APPLE-41	-0.0959	-C.1338	-0.0967	-0.2599	-0.1419	0.0235	0.0429	0.1153	0.2840	0.1263
APPLE-42	-0.2457	0.0379	0.2579	-0.1227	-C.0159	-0.2464	-0.2634	-0.0095	0.1361	0.0510
APPLE-43	-C.1C10	0.0221	-0.2035	0.0428	0.0140	-0.0533	-0.1473	-0.0193	-0.2258	-0.2052
APPLE-44	-0.0705	0.0316	-0.3094	0.1432	-0.2431	-0.1476	-0.1581	-0.2532	-0.1517	-0.1919
APPLE-45	0.2487	-C.1913	-0.3795	0.1026	-0.0758	-0.0282	-0.0934	0.0124	-0.0370	-0.2091
APPLE-46	-0.3C50	0.1445	0.0455	-0.1501	C.0830	-0.0288	-0.1048	0.0214	-0.0562	0.0097
APPLE-47	0.2238	C.1347	0.0740	0.1689	C.0801	-0.2540	-0.0866	-0.0076	0.0704	0.2396
APPLE-48	C.1512	-C.1763	-0.2141	-0.0378	-0.1007	-0.0960	-0.1180	0.2811	0.1043	0.0062
APPLE-49	0.1472	0.0722	-0.06C8	-C.1346	C.1771	-0.0699	0.1424	-0.2971	-0.0095	0.1617
APPLE-50	C.0510	0.2826	-0.1329	0.2254	0.1490	-0.2691	-0.1658	0.0491	-0.0237	-0.0566
CATCN-GN	0.1731	C.1391	-0.0773	0.0295	0.3258	-0.2662	-0.2423	0.2661	-0.0296	0.1064
CATCM-CN	-0.0932	-C.1338	-C.0725	-0.0300	-0.1805	0.0144	-0.0784	0.0205	0.4358	0.0389
MTHAP-GN	C.1149	0.0680	0.2116	C.0799	0.1292	-0.1317	-0.1171	0.2533	0.1725	0.0849
TOTMA-GN	C.0353	-0.0145	0.0447	0.0114	C.04C0	-0.1532	-0.1842	0.2366	0.3717	0.1270

	WD----11	WD----12	WD----13	WD----14	WD----15	WD----16	WD----17	WD----18	WD----19	WD----20
WD-----1	-0.0367	-0.0532	-0.1223	0.3256	0.4330	0.2704	-0.2415	-0.0169	-0.2320	0.0726
WD-----2	-0.0059	-0.0042	-0.1611	0.1846	0.2142	0.0452	-0.1281	0.0927	-0.1990	0.1094
WD-----3	0.2221	0.3004	-0.0032	0.0943	0.1226	0.1021	0.2540	0.3164	-0.1330	0.1395
WD-----4	-0.0373	-0.0357	-0.2635	0.1818	0.1627	-0.0198	-0.2471	-0.0716	0.1098	-0.0108
WD-----5	-0.2727	-0.1414	-0.0385	0.0293	0.1085	0.0697	0.0821	0.0711	-0.2964	0.1014
WD-----6	-0.0459	0.0543	-0.0509	0.1393	0.1356	0.1485	-0.2112	-0.1414	-0.3759	0.1200
WD-----7	-0.0563	0.0763	-0.1170	0.6098	0.4196	0.5326	-0.3624	-0.1487	-0.3037	0.1153
WD-----8	-0.1389	-0.0429	-0.1589	0.2931	0.3117	0.2440	0.2849	0.0474	-0.0351	-0.1403
WD-----9	-0.2004	-0.1103	-0.2804	0.1344	0.0178	0.0034	0.1074	0.1922	-0.1638	-0.0780
WD----10	-0.0602	0.0021	-0.1264	0.1440	0.2439	0.1664	0.2861	0.1641	-0.2654	-0.1484
WD----11	1.0000	0.6399	0.4421	-0.1336	-0.1306	-0.1108	-0.0465	-0.0298	0.1625	0.0229
WD----12	0.6399	1.0000	0.5591	0.0505	0.1332	0.0338	0.0579	-0.1595	-0.0361	-0.1342
WD----13	0.4421	0.5591	1.0000	0.0414	-0.1955	0.1180	0.0229	-0.1116	0.1514	-0.1566
WD----14	-0.1336	0.0505	0.0414	1.0000	0.4389	0.8944	-0.1028	0.1223	-0.0359	-0.1179
WD----15	-0.1306	0.1332	-0.1955	0.4389	1.0000	0.4986	-0.0400	0.0082	-0.2799	0.0518
WD----16	-0.1108	0.0338	0.1180	0.8944	0.4986	1.0000	-0.0582	0.2200	0.0281	-0.0714
WD----17	-0.0465	0.0579	0.0229	-0.1028	-0.0400	-0.0582	1.0000	0.4543	0.0802	-0.2546
WD----18	-0.0298	-0.1595	-0.1116	0.1223	-0.0582	0.2200	0.4543	1.0000	0.1111	0.1627
WD----19	0.1625	-0.0361	0.1514	-0.0359	0.0082	0.0281	0.0802	0.1111	1.0000	-0.1985
WD----20	0.0229	-0.1342	-0.1566	-0.1179	-0.2799	-0.0714	-0.2546	0.1627	-0.1985	1.0000
WD----21	-0.0660	0.1235	0.1883	0.0615	0.0518	-0.2546	0.0679	-0.0503	-0.0754	0.0534
WD----22	-0.2013	-0.1810	-0.2176	0.1841	-0.1547	-0.0709	0.0314	0.2195	-0.3320	-0.0687
WD----23	-0.0536	-0.0302	0.2265	0.1447	0.1918	0.1270	0.2594	0.0694	0.3433	-0.1883
WD----24	0.0168	0.2090	0.1595	0.6699	-0.1595	0.1490	-0.0010	0.2072	-0.0029	-0.0859
WD----25	0.1287	0.2033	-0.2542	0.4130	0.4283	0.7014	-0.2688	-0.0037	-0.1177	0.2227
WD----26	-0.1413	0.1613	-0.1411	0.3934	0.3927	0.3527	-0.0149	0.0656	-0.1983	0.1458
WD----27	0.1118	0.1459	-0.0202	0.3644	0.9025	0.4617	-0.1426	0.2429	-0.1940	0.2578
WD----28	0.0265	-0.0268	0.1682	-0.2578	0.6016	0.4022	-0.0075	-0.0222	0.4971	-0.0360
WD----29	0.1450	0.1753	-0.0576	0.1555	-0.3302	-0.1824	-0.0969	-0.0490	-0.1373	-0.0004
WD----30	0.2345	0.2977	0.0623	-0.0264	0.0585	0.1034	0.2576	0.0756	0.0275	-0.0073
					0.1247	-0.0922				

Grade 2 Math (continued)

	WD----11	WD----12	WD----13	WD----14	WD----15	WD----16	WD----17	WD----18	WD----19	WD----20
RAMOS--1	-0.1191	-0.0862	0.1347	0.0894	0.1160	0.0823	0.0303	-0.2848	0.0050	-0.2389
RAMOS--2	0.0499	0.2215	0.3256	-0.0126	0.0897	0.0517	0.1837	-0.2995	0.0464	-0.3788
RAMOS--3	-0.2050	-0.2912	-0.2126	0.0214	0.1013	-0.0646	-0.1136	-0.0671	-0.1509	0.0941
RAMOS--4	-0.0248	-0.1137	0.1207	0.2508	-0.0698	0.2870	-0.0724	-0.0390	0.2404	-0.1049
RAMOS--5	0.0078	-0.1187	0.0141	0.0258	-0.0730	-0.0770	-0.0756	0.1264	0.0179	0.3288
RAMOS--6	0.3739	0.1196	0.0672	-0.2035	-0.1065	-0.2114	0.0828	-0.0414	0.1410	-0.1763
RAMOS--7	-0.3481	-0.1862	0.0601	0.1120	0.0717	0.1489	0.1574	-0.0019	-0.1312	-0.0098
RAMOS--8	0.1998	0.1044	0.2273	-0.0303	-0.0281	-0.0102	-0.1053	-0.1609	0.2452	-0.2067
RAMOS--9	-0.2443	-0.1097	0.0748	0.1608	0.1890	0.2095	-0.0502	-0.0664	0.0666	-0.1985
RAMOS-10	0.3077	0.0486	0.0425	-0.1898	-0.2385	-0.2294	0.1591	0.0960	0.3024	0.1988
RAMOS-11	-0.0458	0.0684	-0.0343	-0.0678	0.1433	-0.0849	0.2025	-0.0301	0.0102	0.0935
RAMOS-12	0.1837	0.0547	0.2169	0.0016	-0.1719	0.0702	-0.1481	-0.2100	0.1313	-0.0561
RAMOS-13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RAMOS-14	-0.0427	-0.0511	0.2010	-0.2496	-0.1658	-0.2339	0.0986	-0.3668	-0.1517	-0.1083
RAMOS-15	0.0349	-0.0473	0.0254	0.0703	0.1229	0.0784	-0.0677	0.0677	0.0189	-0.0925
RAMOS-16	-0.2059	0.0640	-0.1180	-0.0991	-0.0509	-0.0960	0.0029	0.0299	0.1752	-0.1147
RAMOS-17	-0.3751	-0.3256	-0.2655	-0.0092	-0.1376	0.0188	0.2169	0.0986	0.2422	-0.0803
RAMOS-18	-0.2406	0.1672	-0.1379	0.3402	0.6172	0.3815	0.0333	0.1712	-0.1754	-0.0722
RAMOS-19	0.2922	0.3540	0.5142	0.1017	-0.1380	0.0405	0.0878	-0.0128	0.0064	0.0826
RAMOS-20	0.1196	-0.0525	-0.0857	0.2391	0.1645	0.1899	0.0253	-0.1092	0.0698	-0.2619

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	WD----11	WD----12	WD----13	WD----14	WD----15	WD----16	WD----17	WD----18	WD----19	WD----20
APPLE--1	0.0362	[illegible]	0.3430	-0.0391	0.0193	0.0501	0.0444	-0.1727	-0.1126	-0.1544
APPLE--2	-0.0769	[illegible]	-0.0825	0.1055	0.1209	0.0178	0.0342	-0.0930	-0.0717	0.0377
APPLE--3	0.1439	0.0824	-0.1405	-0.0945	0.1920	-0.0316	0.3305	0.2271	0.0894	-0.0855
APPLE--4	-0.1295	-0.0303	0.0971	-0.0697	0.1059	-0.0199	0.1791	0.0940	-0.1753	-0.1436
APPLE--5	0.1610	0.1073	0.1061	-0.1430	0.0199	-0.1099	-0.1629	-0.0934	0.2043	-0.0728
APPLE--6	-0.0241	-0.2173	-0.0175	0.0217	-0.2171	0.0045	0.1475	-0.1179	0.4463	-0.2372
APPLE--7	-0.2173	-0.1793	0.0643	0.3241	0.0839	0.3726	-0.4388	-0.0510	-0.0173	0.0465
APPLE--8	0.1151	0.0313	-0.0506	-0.1653	-0.1491	-0.1566	0.1558	-0.0024	0.1310	0.1939
APPLE--9	-0.1214	-0.1197	0.0375	0.0975	0.1234	0.2102	0.1575	0.0672	0.0988	0.1962
APPLE-10	-0.0822	0.0697	-0.0253	0.0694	0.1145	0.1476	-0.0739	0.2691	-0.2326	0.1986
APPLE-11	0.0824	0.0809	0.0350	-0.1854	-0.1767	-0.2263	0.1239	0.0776	-0.0090	-0.1306
APPLE-12	0.0992	0.0952	0.1822	-0.1646	-0.1473	-0.2173	0.1662	0.0986	-0.2222	0.1035
APPLE-13	0.0726	-0.0001	-0.2241	0.1305	0.4669	0.1747	-0.1414	-0.0624	-0.0998	0.2468
APPLE-14	-0.1848	-0.0162	0.1994	0.1055	0.1017	0.1663	-0.2862	-0.0592	-0.3861	0.1222
APPLE-15	-0.0617	0.0532	0.0656	0.1084	-0.0375	0.0629	0.1092	-0.1576	0.1366	-0.2408
APPLE-16	0.0063	0.0479	-0.0434	0.2004	-0.1182	0.1283	0.1184	0.0039	0.1225	-0.1236
APPLE-17	0.0040	-0.2067	-0.1942	-0.1215	-0.0676	-0.1306	-0.1478	0.0100	-0.1119	-0.0935
APPLE-19	-0.4251	-0.0120	0.0307	0.0536	0.0262	0.0554	0.2472	-0.0066	0.0396	-0.0519
APPLE-20	-0.0824	-0.1816	0.1577	-0.1671	-0.1909	-0.0832	0.0080	0.1437	-0.2097	0.3613
APPLE-21	-0.1334	-0.0463	-0.2125	0.0632	0.2368	0.1068	0.0656	0.2150	-0.2672	-0.0439
APPLE-22	0.1065	0.0793	0.0329	0.1034	0.0515	0.0812	0.0450	-0.1453	0.4818	-0.2939
APPLE-23	0.0262	-0.0723	0.0447	-0.1534	-0.1768	-0.1618	0.1202	0.0863	-0.3642	0.0569
APPLE-24	0.0962	-0.0391	-0.0858	0.0642	0.1098	0.0127	-0.0581	0.0782	0.0468	0.3464
APPLE-25	-0.2576	-0.2651	-0.1429	0.2425	-0.0620	0.0910	0.2248	0.2587	-0.1558	-0.0757
APPLE-26	-0.0583	0.0070	0.1146	0.3368	0.0938	0.3208	0.0373	-0.2740	0.1530	-0.1999
APPLE-27	-0.0521	0.2108	0.3493	-0.1274	-0.0617	-0.1160	0.1154	-0.1609	-0.0911	-0.1384
APPLE-28	0.1484	0.0121	0.0905	-0.1251	0.1011	-0.0973	-0.0397	-0.0260	0.0855	0.3129
APPLE-29	0.1214	-0.0182	0.2596	-0.0742	-0.1784	0.0093	-0.1012	-0.2050	0.2845	-0.2900
APPLE-30	-0.1958	0.0348	-0.1572	0.4307	0.4644	0.3350	-0.2506	-0.0740	-0.3040	-0.0537

Grade 2 Math (continued)

	WD----11	WD----12	WD----13	WD----14	WD----15	WD----16	WD----17	WD----18	WD----19	WD----20
APPLE-31	0.1910	0.0291	-0.1283	-0.0861	-0.0556	-0.0724	-0.1896	0.0522	0.1837	0.2169
APPLE-32	-0.1881	-0.3412	-0.1765	-0.1223	-0.1471	-0.1013	0.1088	-0.3432	0.2164	-0.1479
APPLE-33	-0.3397	-0.1425	0.0391	-0.0294	-0.1550	0.0340	-0.2313	-0.0373	-0.1999	0.2414
APPLE-34	0.0166	-0.1610	0.0055	-0.0427	-0.1021	-0.0464	0.1305	-0.0213	-0.0304	-0.1798
APPLE-35	-0.2299	-0.2847	-0.1246	0.2111	-0.0707	0.2671	0.0492	-0.0114	0.0995	0.0041
APPLE-36	-0.0397	-0.1010	0.0648	-0.2192	-0.1112	-0.1661	0.1342	0.0131	0.0931	-0.1373
APPLE-37	0.1101	0.0826	0.1744	0.1416	0.0153	0.1495	0.1395	0.1261	0.1206	-0.1496
APPLE-38	0.0657	-0.0250	0.0230	-0.0354	-0.0692	-0.0160	0.0890	0.0661	0.0267	-0.0963
APPLE-39	-0.0764	-0.0474	0.0771	0.2429	-0.2173	0.1181	0.1561	0.1182	-0.0872	-0.1829
APPLE-40	0.0064	0.0599	0.0508	-0.1982	-0.1731	-0.1471	0.0718	0.0687	-0.0497	-0.0160
APPLE-41	-0.0807	0.0843	0.0698	0.2880	-0.0305	0.3216	-0.0126	0.0846	-0.0311	-0.1128
APPLE-42	0.3803	0.2719	0.3362	-0.0840	-0.2045	-0.0372	0.2927	0.1402	0.2220	-0.0693
APPLE-43	-0.3386	-0.1671	-0.2100	-0.0813	0.2302	-0.0317	-0.0294	-0.0840	0.0413	-0.0828
APPLE-44	0.0769	-0.1355	0.0149	-0.1642	-0.1035	-0.1761	-0.1961	-0.0435	0.2224	-0.0003
APPLE-45	-0.3203	-0.3037	-0.1340	0.0448	0.2860	0.0431	0.1768	0.0715	0.0482	0.1195
APPLE-46	0.2455	0.1929	0.3951	0.0733	-0.2120	0.0589	-0.0320	-0.1474	0.0925	-0.1788
APPLE-47	-0.0918	0.0168	-0.1396	-0.0494	0.3009	-0.0008	-0.0212	0.0835	-0.0437	0.1790
APPLE-48	-0.0330	-0.0321	0.0644	-0.0513	-0.0150	-0.0676	-0.1645	-0.1097	0.1381	-0.1543
APPLE-49	-0.0555	-0.0372	-0.1360	0.0622	0.2023	0.1514	-0.2116	-0.0391	-0.1644	0.2151
APPLE-50	-0.0388	-0.1654	-0.0469	-0.1122	-0.2776	-0.2522	0.1499	0.0931	0.2444	0.1826
CATCH-GN	0.1943	0.0130	0.1436	-0.1078	0.0647	-0.0291	0.1783	0.1714	0.0801	0.0428
CATCH-GN	0.0803	-0.1723	-0.2165	-0.2072	-0.0757	-0.2826	-0.2437	-0.1831	-0.1861	-0.1915
MTHAP-GN	0.0012	-0.1656	-0.5013	-0.0915	0.1267	-0.0314	0.0467	0.3420	-0.0496	0.0343
TCTMA-GN	0.1006	-0.2207	-0.3789	-0.2063	0.0591	-0.1908	-0.0624	0.1299	-0.1415	-0.0834

	WD----21	WD----22	WD----23	WD----24	WD----25	WD----26	WD----27	WD----28	WD----29	WD----30
WD-----1	-0.0530	0.1065	-0.0482	0.2762	0.3127	0.1927	0.4751	0.0986	0.0873	-0.1650
WD-----2	0.1683	0.0824	-0.3360	-0.0026	0.1788	0.1822	0.3341	0.0373	0.0142	0.0227
WD-----3	-0.1071	0.1829	-0.1857	0.1003	0.0418	0.2508	0.1888	-0.1883	0.2595	0.1900
WD-----4	0.0426	-0.1098	-0.0684	0.0352	0.2966	0.1256	0.3055	0.1932	0.0481	-0.0349
WD-----5	0.2460	0.0456	-0.1621	0.0429	-0.1953	-0.0390	-0.0658	0.2026	0.0266	-0.0725
WD-----6	0.0769	0.0120	-0.2182	0.0834	0.3633	0.1793	0.1280	-0.5075	0.2848	0.0752
WD-----7	0.1695	0.1382	-0.0680	0.3814	0.6205	0.4351	0.4006	-0.5245	0.4512	0.0351
WD-----8	-0.3769	0.1637	0.1225	0.0555	0.0488	0.2946	-0.0009	-0.1693	-0.0561	0.1709
WD-----9	-0.0847	0.2809	-0.0036	0.1515	-0.1077	-0.0728	-0.0723	-0.2028	0.0045	-0.1476
WD----10	-0.3082	0.2911	-0.1778	0.1273	0.1957	0.2163	0.2184	-0.1625	-0.0342	0.0620
WD----11	-0.0660	-0.2013	-0.0536	0.0168	0.1287	-0.1413	0.1118	0.0265	0.1450	0.2345
WD----12	0.1235	-0.1810	-0.0302	0.2090	0.2033	0.1613	0.1459	-0.0268	0.1753	0.2977
WD----13	0.1883	-0.2176	0.2265	0.1595	-0.2542	-0.1411	-0.0202	0.1682	-0.0576	0.0623
WD----14	0.0615	0.1841	0.1447	0.6699	0.4130	0.3934	0.3644	-0.2578	0.1555	-0.0264
WD----15	-0.1547	0.1918	-0.1595	0.4283	0.3927	0.9025	0.6016	-0.3302	0.0585	0.1247
WD----16	-0.0709	0.1270	0.1490	0.7014	0.3527	0.4617	0.4022	-0.1824	0.1034	-0.0922
WD----17	0.0679	0.0314	0.2594	-0.0010	-0.2688	-0.0149	-0.1426	-0.0075	-0.0969	0.2576
WD----18	-0.0503	0.2195	0.0694	0.2072	-0.0037	0.0656	0.2429	-0.0222	-0.0490	0.0756
WD----19	-0.0754	-0.3320	0.3433	-0.0029	-0.1177	-0.1983	-0.1940	0.4971	-0.1373	0.0275
WD----20	0.0534	-0.0687	-0.1883	-0.0859	0.2227	0.1458	0.2578	-0.0360	-0.0004	-0.0373
WD----21	1.0000	-0.0280	0.2520	-0.0566	-0.0288	-0.0780	-0.1275	-0.1520	0.1976	0.1624
WD----22	-0.0280	1.0000	-0.1285	0.2434	-0.0486	0.1398	0.0673	-0.3162	0.2545	0.1378
WD----23	0.2520	-0.1285	1.0000	0.0906	-0.1763	-0.1152	-0.1726	-0.0077	0.1260	-0.0919
WD----24	-0.0566	0.2434	0.0906	1.0000	0.2568	0.3678	0.4835	-0.1802	0.2696	-0.0366
WD----25	-0.0288	-0.0486	-0.1763	0.2568	1.0000	0.4442	0.5220	-0.2824	0.1197	0.0215
WD----26	-0.0780	0.1398	-0.1152	0.3678	0.4442	1.0000	0.5853	-0.4203	-0.0328	0.1862
WD----27	-0.1275	0.0673	-0.1726	0.4835	0.5220	0.5853	1.0000	-0.2028	-0.0153	-0.0364
WD----28	-0.1520	-0.3162	-0.0077	-0.1802	-0.2824	-0.4203	-0.2028	1.0000	-0.2612	-0.0486
WD----29	0.1976	0.2545	0.1260	0.2696	0.1197	-0.0328	-0.0153	-0.2612	1.0000	0.2062
WD----30	0.1624	0.1378	-0.0919	-0.0366	0.0215	0.1862	-0.0364	-0.0486	0.2062	1.0000

Grade 2 Math (continued)

	WC----21	WC----22	WC----23	WD----24	WD----25	WD----26	WD----27	WD----28	WD----29	WD----30
RAMOS--1	0.1489	0.2696	-0.0675	0.1427	-0.1411	-0.0399	-0.0266	0.0986	0.0286	0.0190
RAMOS--2	0.1404	-0.2383	-0.0741	0.0955	-0.0840	0.0009	-0.0106	0.0591	-0.0686	0.0378
RAMOS--3	0.0605	0.4955	-0.1450	0.0061	-0.0463	-0.0313	0.0162	0.0335	0.1178	-0.0702
RAMOS--4	-0.0397	0.2177	0.2727	0.2095	-0.1292	-0.0609	-0.1071	0.1023	-0.0123	0.1219
RAMOS--5	0.1942	0.3709	0.1126	-0.0677	-0.0127	0.0411	0.0895	-0.0885	-0.0151	0.0273
RAMOS--6	-0.0130	-0.2431	-0.0379	0.0582	0.2362	-0.1061	0.1969	-0.0285	-0.1186	0.0845
RAMOS--7	0.1407	0.2560	0.0291	0.0234	0.0640	0.0253	0.1037	0.0776	-0.0946	-0.0324
RAMOS--8	-0.0745	-0.0708	-0.0951	0.0924	-0.2424	-0.1939	-0.0710	0.3897	-0.1164	-0.0743
RAMOS--9	-0.0672	0.2523	-0.0191	0.1663	0.0876	0.0668	0.1604	0.2450	-0.0500	-0.0732
RAMOS-10	0.0331	-0.1688	0.0270	-0.0975	-0.1316	-0.1836	0.0717	0.3177	-0.1908	0.0926
RAMOS-11	-0.0367	0.2538	-0.3339	0.2202	0.1341	0.1859	0.2798	0.1334	-0.2033	0.2114
RAMOS-12	-0.0067	0.0230	-0.0491	0.0663	0.0057	-0.1578	-0.1776	0.1222	-0.0207	0.0855
RAMOS-13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RAMOS-14	0.4288	-0.1151	0.0289	-0.2381	-0.1687	-0.1530	-0.2454	-0.1388	-0.0096	-0.0608
RAMOS-15	-0.0430	0.3186	-0.1559	0.2713	0.0463	-0.0117	0.2590	0.2469	-0.0439	-0.0044
RAMOS-16	-0.0759	-0.1017	-0.1017	-0.1238	-0.0942	-0.0444	-0.0780	0.1288	-0.0954	-0.0381
RAMOS-17	-0.1184	-0.2160	0.0709	-0.2597	-0.0820	-0.1794	-0.1794	0.2124	-0.0835	-0.1103
RAMOS-18	-0.0886	0.2376	-0.1188	0.3025	0.3884	0.6699	0.4558	-0.2434	-0.0708	0.0992
RAMOS-19	0.2241	-0.0313	0.2894	-0.0177	0.0447	-0.0337	-0.0251	-0.2037	0.0368	-0.0694
RAMOS-20	-0.1732	0.1641	0.2860	0.2142	-0.1645	-0.1013	0.0139	0.1000	0.1016	-0.0483

	WC----21	WD----22	WC----23	WD----24	WD----25	WD----26	WD----27	WD----28	WD----29	WD----30
APPLE--1	0.2772	-0.0771	-0.1475	-0.0153	-0.0488	0.0370	-0.0582	-0.1363	-0.0386	0.0214
APPLE--2	-0.1691	-C.1093	-0.0947	-C.0109	0.0766	0.1881	-0.0322	-0.1613	-0.1673	-0.1566
APPLE--3	-0.2211	-0.0064	0.025C	-0.0760	-C.0224	0.2394	0.2502	0.0043	-0.2233	0.1651
APPLE--4	-0.2069	C.0683	0.0340	-0.1056	-0.1170	0.1679	-0.0183	-0.3677	-0.1796	0.0321
APPLE--5	-C.1581	-C.1595	0.1881	-C.0564	0.0569	0.0535	0.1084	0.0865	-0.1899	0.0903
APPLE--6	-0.2394	-C.2059	-0.1150	-0.0322	-C.1590	-0.1893	-0.1839	0.3148	-0.2970	0.0469
APPLE--7	-0.1109	0.0291	0.0493	0.3427	0.1809	-0.0634	0.3291	0.1551	-0.0359	-0.3839
APPLE--8	-0.1105	-0.1954	0.1445	-0.1391	0.0849	-0.0774	-0.1510	-0.0615	-0.1225	-0.2321
APPLE--9	C.0160	C.1407	0.1995	0.0507	0.0668	0.2082	-0.0210	-0.0014	-0.1597	0.2252
APPLE-10	0.0556	-C.0345	-0.2207	0.0314	0.1832	0.1770	0.4220	0.0780	-0.2312	-0.1954
APPLE-11	C.1235	-0.2253	-0.1768	-0.1913	-0.1634	-0.1642	0.0053	0.1374	-0.1675	0.0487
APPLE-12	-0.0930	C.0408	0.0149	-0.2712	-0.1827	-0.1029	0.1868	-0.0712	-0.1065	0.0135
APPLE-13	-0.2092	-0.0413	-0.1313	0.1146	C.3160	0.4986	0.2090	-0.1934	-0.0463	0.0889
APPLE-14	C.1640	0.2653	-0.1929	0.1971	-0.0878	-0.0778	0.1275	0.0718	0.0494	-0.2053
APPLE-15	-0.0259	-0.1481	-0.0266	0.0980	-0.1520	-0.1273	-C.1181	0.2868	-0.1072	-0.0891
APPLE-16	0.2795	-0.1941	0.1384	C.0659	-0.0960	-0.1212	-0.2290	0.1425	-0.0229	0.0729
APPLE-17	-0.1670	C.2392	-0.1917	-0.1013	-0.0927	-0.1280	-0.0108	-0.1032	-0.1809	-0.1177
APPLE-19	C.1113	0.3797	0.2612	0.3571	-0.1630	0.0951	-0.0795	0.0732	-0.0504	-0.0767
APPLE-20	C.1630	-C.3159	-0.0008	-0.2120	-0.2113	-0.1282	0.0866	-0.1349	-0.1080	-0.0652
APPLE-21	-0.1840	C.4157	-0.1703	0.0268	0.0619	0.2629	0.1477	-0.2847	-0.1467	-0.0112
APPLE-22	-0.1684	-C.3189	0.0353	-0.0089	0.1537	0.1260	0.0290	0.3666	-0.3151	0.1782
APPLE-23	C.1676	0.0292	-0.1422	-C.1874	-0.2528	-0.1386	-0.1374	-0.3611	-0.1217	-0.2361
APPLE-24	0.C124	0.1155	0.0561	0.0274	0.2455	0.2258	0.1623	-0.3832	-0.0006	-0.0077
APPLE-25	-0.1C01	0.2306	-0.1233	0.2251	-0.1219	-0.0540	-0.0948	-0.2126	0.0477	-0.1425
APPLE-26	-C.0939	-C.3C15	0.0145	-0.0609	0.1872	0.1416	-0.1163	0.0373	-0.1702	0.0230
APPLE-27	-0.0997	-0.1228	0.2243	-0.1491	-0.1214	-0.0538	-0.0944	0.1620	-0.0372	-0.1605
APPLE-28	-0.1406	-0.1910	-0.1190	0.0784	0.0741	0.1594	0.1994	0.1513	-0.1876	0.0362
APPLE-29	C.0053	-C.0496	0.2550	-0.0260	-0.2486	-0.1540	-0.1574	0.2314	-0.2380	0.1576
APPLE-30	-0.0682	C.3314	-0.1535	0.3030	0.3188	0.2410	0.4189	0.0812	0.0216	-0.1051

Grade 2 Math (continued)

	WD----21	WD----22	WD----23	WD----24	WD----25	WD----26	WD----27	WD----28	WD----29	WD----30
APPLE-31	-0.0899	-0.0939	-0.0833	-0.1344	0.3271	-0.0485	-0.0851	0.1370	-0.0311	-0.0422
APPLE-32	0.0432	-0.1552	0.0964	-0.3304	-0.1068	-0.1041	-0.1787	0.0645	-0.2184	-0.1758
APPLE-33	0.3293	0.0832	-0.0062	0.1845	0.1033	-0.0983	0.1001	-0.1387	-0.0158	-0.4157
APPLE-34	0.0226	-0.1553	0.2468	-0.2503	-0.0242	-0.1144	-0.1662	-0.1233	-0.1770	-0.1182
APPLE-35	-0.1142	-0.1407	0.2004	-0.1708	0.2468	-0.0616	-0.1082	0.0734	-0.0603	-0.2139
APPLE-36	0.1040	-0.2049	0.0670	-0.2265	-0.1736	-0.0903	-0.1573	0.0854	-0.1391	0.0656
APPLE-37	-0.2410	-0.0315	-0.1658	0.0944	-0.1958	0.0455	-0.1159	0.1061	-0.1868	0.0331
APPLE-38	0.0840	-0.1517	-0.0159	-0.0772	-0.1872	-0.0103	-0.1867	-0.2275	-0.1615	-0.0110
APPLE-39	0.0283	0.0817	-0.1452	0.3087	-0.1261	-0.1766	-0.1606	-0.2116	-0.0805	-0.1341
APPLE-40	-0.0010	-0.2651	-0.0245	-0.4184	-0.0632	-0.1510	-0.1084	0.2498	-0.2498	-0.2348
APPLE-41	0.0010	0.3134	0.0938	0.3901	0.0452	0.0194	-0.0216	-0.1816	-0.0869	-0.0324
APPLE-42	0.0920	-0.1505	-0.1189	0.0313	-0.1871	-0.1374	0.0771	0.2020	-0.1990	0.1105
APPLE-43	-0.1418	-0.0801	-0.2014	-0.1271	-0.0516	0.2723	0.0410	0.0797	-0.2369	0.0444
APPLE-44	-0.0797	-0.1272	-0.1272	-0.0706	-0.0118	-0.0582	0.0827	0.1881	-0.1763	-0.0433
APPLE-45	0.0293	-0.1382	0.2344	-0.0496	0.0487	0.1863	0.0938	-0.0103	-0.3185	-0.1303
APPLE-46	0.0264	-0.2088	-0.2455	-0.0537	-0.2443	-0.2075	-0.1663	0.1354	-0.1921	0.0461
APPLE-47	-0.2298	-0.0276	-0.1503	-0.0670	0.1360	0.3480	0.1601	0.0924	-0.1462	0.1122
APPLE-48	-0.1517	-0.0260	0.2058	-0.0838	-0.0979	-0.0819	-0.0625	0.1555	-0.0827	0.0146
APPLE-49	0.1665	0.0060	-0.1443	-0.0059	0.3500	0.2700	0.1156	-0.1859	-0.1383	-0.1679
APPLE-50	0.4433	0.0012	0.3419	-0.2580	-0.1148	-0.1776	-0.1787	0.1734	-0.0151	0.2936
CATCH-ON	-0.1218	0.0711	0.2874	-0.0313	-0.2973	-0.0101	-0.0877	0.1597	-0.0385	0.1525
CATCH-ON	-0.1604	0.2100	-0.0702	-0.0934	-0.1819	-0.1562	-0.2806	-0.3166	0.2347	-0.1336
MTHAP-ON	-0.3284	0.3387	-0.0618	-0.0928	-0.0478	0.0080	-0.0324	0.0520	0.1364	0.0829
TOTMA-ON	-0.3311	0.3698	-0.0140	-0.0927	-0.2386	-0.0785	-0.2122	-0.1369	0.2188	0.0241

Grade 2 Math (continued)

	RAMOS--1	RAMOS--2	RAMOS--3	RAMOS--4	RAMOS--5	RAMOS--6	RAMOS--7	RAMOS--8	RAMOS--9	RAMOS-10
WC-----1	0.2163	-0.0050	0.3274	-0.0715	0.0853	0.0801	0.0813	0.1741	0.2446	0.0105
WC-----2	0.1636	-0.0265	0.2379	-0.1844	0.2019	0.0580	0.0228	0.1261	0.0539	0.1572
WC-----3	-0.1792	-0.1898	0.0296	-0.2064	0.3097	-0.1183	-0.1600	-0.1889	-0.1748	0.1289
WC-----4	-0.1166	-0.2156	0.0710	-0.0001	-0.0282	0.1074	0.0461	0.0052	0.1600	0.0422
WC-----5	0.2676	0.2595	0.1200	-0.0482	-0.1575	-0.1675	0.1366	0.0837	0.0306	-0.0184
WC-----6	0.0193	0.1483	-0.0794	-0.1021	-0.0580	-0.0954	0.1339	-0.2088	0.0558	-0.2813
WC-----7	0.0885	-0.0262	0.1241	0.0391	0.1015	-0.1908	0.1390	-0.2085	0.1565	-0.3017
WC-----8	-0.0961	-0.0541	-0.0632	-0.0326	0.0413	-0.1061	-0.0946	-0.1032	-0.1031	-0.0056
WC-----9	-0.2779	-0.2812	-0.0310	-0.1114	-0.0623	-0.0808	-0.2552	-0.1717	-0.3175	-0.1686
WC----10	0.0510	0.0072	0.1036	-0.0903	-0.0110	0.0498	-0.0087	-0.0638	0.0103	-0.0505
WC----11	-0.1191	0.0499	-0.2050	-0.0248	0.0078	0.3739	-0.3481	0.1998	-0.2443	0.3077
WC----12	-0.0862	0.2215	-0.2912	-0.1137	-0.1187	0.1196	-0.1862	0.1044	-0.1097	0.0486
WC----13	0.1347	0.3256	-0.2126	0.1207	0.0141	0.0672	0.0601	0.2273	0.0748	0.0425
WC----14	0.0894	-0.0126	0.0214	0.2508	0.0258	-0.2035	0.1120	-0.0303	0.1608	-0.1898
WC----15	0.1160	0.0897	0.1013	-0.0698	-0.0730	-0.1065	0.0717	-0.0281	0.1890	-0.2385
WC----16	0.0823	0.0517	-0.0646	0.2870	-0.0770	-0.2114	0.1489	-0.0102	0.2095	-0.2294
WC----17	0.0303	0.1837	-0.1136	-0.0724	-0.0756	0.0828	0.1574	-0.1053	-0.0502	0.1591
WC----18	-0.2848	-0.2596	-0.0671	-0.0390	0.1264	-0.0414	-0.0019	-0.1609	-0.0664	0.0960
WC----19	0.0050	0.0464	-0.1509	0.2404	0.0179	0.1410	-0.1312	0.2452	0.0666	0.3024
WC----20	-0.2389	-0.3788	0.0941	-0.1049	0.3288	-0.1763	-0.0098	-0.2067	-0.1985	0.1988
WC----21	0.1489	0.1404	0.0605	-0.0397	0.1942	-0.0130	0.1407	-0.0745	-0.0672	0.0331
WC----22	0.2696	-0.2383	0.4955	0.2177	0.3709	-0.2431	0.2560	-0.0708	0.2523	-0.1688
WC----23	-0.0675	-0.0741	-0.1450	0.2727	0.1126	-0.0379	0.0291	-0.0951	-0.0191	0.0270
WC----24	0.1427	0.0955	0.0061	0.2095	-0.0677	0.0582	0.0234	0.0924	0.1663	-0.0975
WC----25	-0.1411	-0.0840	-0.0463	-0.1292	-0.0127	0.2362	0.0640	-0.2424	0.0876	-0.1316
WC----26	-0.0399	0.0009	-0.0313	-0.0609	0.0411	-0.1061	0.0253	-0.1939	0.0668	-0.1836
WC----27	-0.0266	-0.0106	0.0162	-0.1071	0.0895	0.1969	0.1037	-0.0710	0.1604	0.0717
WC----28	0.0986	0.0591	0.0335	0.1023	-0.0885	-0.0285	0.0776	0.3897	0.2450	0.3177
WC----29	0.0286	-0.0686	0.1178	-0.0123	-0.0151	-0.1186	-0.0946	-0.1164	-0.0500	-0.1908
WC----30	0.0190	0.0378	-0.0702	0.1219	0.0273	0.0845	-0.0324	-0.0943	-0.0732	0.0926

Grade 2 Math (continued)

	RAMOS--1	RAMOS--2	RAMOS--3	RAMOS--4	RAMOS--5	RAMOS--6	RAMOS--7	RAMOS--8	RAMOS--9	RAMOS-10
RAMOS--1	1.0000	0.6236	0.5981	0.2519	0.2531	0.0914	0.5131	0.5760	0.6835	0.1549
RAMOS--2	0.6236	1.0000	-0.1672	-0.0363	-0.1933	0.3231	0.2839	0.3083	0.2390	0.1814
RAMOS--3	0.5981	-0.1672	1.0000	-0.0543	0.5102	-0.1853	0.2959	0.4544	0.5423	0.0472
RAMOS--4	0.2519	-0.0363	-0.0543	1.0000	-0.0504	-0.0573	0.2450	0.0275	0.3295	-0.1323
RAMOS--5	0.2531	-0.1933	0.5102	-0.0504	1.0000	-0.0877	0.0962	0.1036	0.1137	0.4829
RAMOS--6	0.0914	0.3231	-0.1853	-0.0573	-0.0877	1.0000	-0.0489	0.0722	0.0155	0.2721
RAMOS--7	0.5131	0.2839	0.2959	0.2450	0.0962	-0.0489	1.0000	-0.1422	0.7307	-0.2310
RAMOS--8	0.5760	0.3083	0.4544	0.0275	0.1036	0.0722	-0.1422	1.0000	0.3814	0.3570
RAMOS--9	0.6835	0.2390	0.5423	0.3295	0.1137	0.0155	0.7307	0.3814	1.0000	-0.2225
RAMOS-10	0.1549	0.1814	0.0472	-0.1323	0.4829	0.2721	-0.2310	0.3570	-0.2225	1.0000
RAMOS-11	0.3871	0.1967	0.3742	-0.1591	0.3767	0.2769	0.2991	0.2060	0.3089	0.4211
RAMOS-12	0.3907	0.3264	-0.0903	0.6564	-0.0996	0.1319	0.3219	0.0813	0.3227	-0.0322
RAMOS-13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RAMOS-14	0.4379	0.5694	0.0372	-0.0728	-0.0199	0.0912	0.2667	0.0475	0.0298	0.0677
RAMOS-15	0.6105	0.0814	0.6401	0.2424	0.2201	0.1657	0.4527	0.5138	0.7949	0.0537
RAMOS-16	0.0825	0.1932	-0.1076	0.0430	-0.0367	-0.0612	-0.2119	0.1412	-0.0915	0.2043
RAMOS-17	0.0390	0.1733	-0.1026	-0.0425	-0.1245	-0.0117	0.0707	0.0328	0.0684	0.0789
RAMOS-18	0.0366	0.2183	-0.1603	-0.0411	-0.0429	-0.0715	0.2414	-0.1301	0.2191	-0.1500
RAMOS-19	-0.0119	0.0015	0.0047	-0.1026	0.3215	0.0911	0.0898	-0.0550	-0.0636	0.0863
RAMOS-20	0.2560	0.0262	0.1403	0.4345	-0.0837	-0.0657	0.0500	0.2172	0.1966	0.0827

	RAMOS--1	RAMOS--2	RAMOS--3	RAMOS--4	RAMOS--5	RAMOS--6	RAMOS--7	RAMOS--8	RAMOS--9	RAMOS-10
APPLE--1	0.5223	0.6449	0.0615	-0.0493	0.0117	-0.0713	0.3005	0.2096	0.1987	0.0466
APPLE--2	-0.2169	-0.1142	-0.1128	-0.1434	-0.0497	0.0337	-0.1883	-0.2322	-0.3094	-0.0341
APPLE--3	-0.1865	0.0008	-0.2519	-0.0072	-0.0792	-0.0071	-0.0031	-0.0939	-0.0101	0.2287
APPLE--4	-0.1097	0.0286	-0.1977	0.0271	0.0286	0.1154	0.0952	-0.2397	-0.0151	-0.1521
APPLE--5	-0.3128	-0.1661	-0.2225	-0.0739	-0.0461	0.1863	-0.3248	-0.0813	-0.2697	0.0155
APPLE--6	0.1267	0.2815	-0.2379	0.2800	-0.1555	0.2793	-0.0100	0.0777	0.0150	0.2502
APPLE--7	0.1984	0.0240	0.1797	0.1430	0.1035	-0.0589	0.2428	0.2219	0.4507	-0.0793
APPLE--8	-0.0320	-0.0594	0.0991	-0.1033	0.1208	0.0640	0.0349	0.0557	0.0810	0.0536
APPLE--9	0.3040	0.0627	0.0848	0.5816	0.1636	-0.0045	0.3847	-0.0304	0.3149	0.0468
APPLE-10	-0.1598	-0.1042	-0.0547	-0.1416	0.0916	-0.0345	0.1082	-0.1300	0.0846	0.0313
APPLE-11	-0.1207	0.0369	-0.1699	-0.0767	-0.0481	0.2064	-0.0600	-0.0596	-0.0131	-0.0628
APPLE-12	-0.1448	-0.1225	-0.0875	0.0271	0.0581	-0.0618	0.1635	-0.2121	-0.0313	0.0231
APPLE-13	-0.0687	-0.1516	0.0639	0.0070	-0.0154	-0.0476	-0.1664	-0.1740	-0.1623	-0.0962
APPLE-14	0.2904	0.0957	0.2833	0.0154	0.1774	-0.1726	0.2469	0.1669	0.3048	-0.0819
APPLE-15	0.2671	0.2439	0.2144	-0.2014	-0.1675	0.1092	0.1045	0.4407	0.2322	0.0893
APPLE-16	-0.0641	0.0476	-0.1101	-0.0499	-0.1079	-0.0029	0.0079	0.1657	-0.0684	0.1612
APPLE-17	0.0475	-0.1191	0.2079	-0.0330	0.0014	0.0661	0.0062	0.1805	0.0368	-0.0435
APPLE-19	0.1323	-0.0474	0.1926	0.2646	0.1059	-0.1700	0.3166	0.0003	0.2739	0.0054
APPLE-20	-0.0426	0.0977	-0.2014	0.0637	0.1298	0.1128	0.1710	-0.2643	-0.0545	0.0293
APPLE-21	-0.0263	0.0108	-0.0316	-0.0755	0.2399	-0.0938	-0.0547	-0.0401	-0.0056	0.0005
APPLE-22	-0.0278	-0.0133	0.0002	-0.0366	-0.1176	0.1944	-0.1807	0.2945	0.0964	0.2459
APPLE-23	-0.1114	-0.0060	-0.0920	-0.1249	-0.0145	0.0037	0.0753	-0.2065	-0.2444	-0.1474
APPLE-24	-0.1419	-0.3129	0.1229	-0.0133	0.2669	0.1065	0.0339	-0.2615	-0.1343	0.0568
APPLE-25	-0.2075	-0.2175	-0.0314	-0.0491	-0.0542	-0.0903	-0.1117	-0.1378	-0.2361	0.0042
APPLE-26	0.0803	0.1532	0.0114	-0.1166	-0.1488	-0.0565	-0.0719	0.1640	0.0568	-0.0182
APPLE-27	-0.0309	0.1294	-0.1679	-0.0221	-0.0457	-0.0762	0.1244	-0.0686	0.0593	-0.0794
APPLE-28	-0.1715	-0.0332	-0.1613	-0.0942	-0.0042	0.2070	-0.0287	-0.1500	-0.1527	0.1383
APPLE-29	0.1767	0.0966	0.0277	0.2537	0.0281	0.2089	-0.1103	0.2701	0.0167	0.1269
APPLE-30	0.3267	0.1304	0.2815	0.0589	0.1177	-0.0993	0.3069	0.2562	0.4788	-0.0264

Grade 2 Math (continued)

	RAMOS--1	RAMOS--2	RAMOS--3	RAMOS--4	RAMOS--5	RAMOS--6	RAMOS--7	RAMOS--8	RAMOS--9	RAMOS-10
APPLE-31	-0.1027	-0.0286	-0.0921	-0.0395	-0.0412	-0.0687	-0.0441	-0.1250	-0.1342	0.0012
APPLE-32	0.2130	0.2362	0.0610	-0.0566	0.1297	0.1592	0.0417	0.0370	-0.0344	0.2891
APPLE-33	0.1343	0.0729	0.1524	-0.1103	0.0913	-0.0489	0.2575	-0.0316	0.1709	-0.0833
APPLE-34	-0.0576	0.0349	-0.0620	-0.1205	-0.0224	0.1130	-0.0816	0.0944	0.0231	0.0311
APPLE-35	-0.0673	-0.0514	-0.0128	-0.0502	-0.0524	-0.0873	0.1667	-0.0953	0.1058	-0.0882
APPLE-36	0.1181	0.2444	-0.0725	-0.0441	-0.0529	-0.0575	0.1311	0.0218	0.0508	0.1050
APPLE-37	-0.1106	-0.0149	-0.0811	-0.1087	-0.1185	-0.1592	-0.3514	0.3478	-0.2149	0.2593
APPLE-38	-0.0953	0.0016	-0.1715	0.0742	0.0520	0.1510	-0.0920	-0.1679	-0.1957	-0.0508
APPLE-39	0.0740	0.1621	-0.0372	-0.0700	-0.0170	0.0184	-0.1334	0.1871	-0.1293	0.0758
APPLE-40	-0.1552	-0.2361	0.0889	-0.1110	-0.0514	-0.1125	-0.0436	0.1293	0.1100	-0.0916
APPLE-41	0.0679	-0.0137	-0.0228	0.2983	-0.0196	-0.0077	0.2125	0.0013	0.1215	-0.1488
APPLE-42	-0.1193	0.1640	-0.2907	-0.1274	0.0915	0.1712	-0.2084	0.0497	-0.2633	0.3426
APPLE-43	0.1631	0.2310	0.0150	-0.0600	-0.1016	0.0360	-0.0458	0.2860	0.0982	0.1602
APPLE-44	0.1006	-0.1153	0.2902	-0.0735	0.0848	0.1862	-0.2363	0.5366	0.1183	0.2367
APPLE-45	0.0763	0.0726	0.0177	0.0243	0.0063	0.0649	0.3053	-0.0968	0.2220	-0.0871
APPLE-46	0.2012	0.3466	-0.0128	-0.1481	-0.1404	-0.0302	0.0318	0.4219	0.0627	0.0972
APPLE-47	-0.0762	-0.1111	0.0107	0.0120	-0.0546	-0.1456	0.0140	-0.2133	-0.0575	-0.0115
APPLE-48	-0.1810	-0.1855	-0.0211	-0.0636	-0.0696	-0.0395	-0.1932	-0.0242	-0.1421	-0.1438
APPLE-49	-0.0577	-0.1300	0.0380	0.0574	-0.0776	-0.0318	0.0290	-0.2545	-0.0805	-0.2497
APPLE-50	0.1079	-0.0653	0.0863	0.2492	0.3089	0.0900	-0.0025	0.1512	-0.0217	0.4306
CATCH-GN	0.0353	0.0744	-0.1505	0.2685	0.0023	-0.0600	-0.0494	0.1222	-0.1097	0.2180
CATCH-GN	-0.1547	-0.2696	0.0912	-0.0306	-0.0981	0.0897	-0.4406	-0.0189	-0.2435	-0.2946
MTHAP-GN	-0.1860	-0.2051	-0.0905	0.1186	-0.0454	-0.1279	-0.1312	-0.1335	-0.1283	0.0420
TCTHA-GN	-0.1677	-0.2533	-0.0221	0.1418	-0.0888	-0.0701	-0.3665	-0.0388	-0.2647	-0.1083

	RAMOS-11	RAMOS-12	RAMOS-13	RAMOS-14	RAMOS-15	RAMOS-16	RAMOS-17	RAMOS-18	RAMOS-19	RAMOS-20
WC-----1	0.1038	-0.1981	0.0	-0.0873	0.2874	0.1435	-0.1124	0.0485	0.0626	0.2930
WC-----2	0.1305	-0.2303	0.0	-0.1074	0.1104	0.1527	0.0290	0.0645	0.0711	-0.2567
WC-----3	0.1441	-0.2425	0.0	-0.2764	-0.0935	0.0082	-0.0355	0.0987	0.2197	-0.3437
WC-----4	0.0574	-0.2476	0.0	-0.3599	0.2399	-0.0119	0.0217	0.1221	-0.1238	0.0256
WC-----5	-0.1111	0.1184	0.0	0.1952	-0.0289	0.2224	0.1502	-0.0985	-0.0743	0.0268
WC-----6	-0.0918	0.1115	0.0	0.1841	0.0207	-0.0744	-0.2042	0.2729	-0.0349	-0.1549
WD-----7	-0.1098	0.0830	0.0	-0.0415	0.0935	-0.1091	-0.1626	0.2720	0.0755	0.0158
WD-----8	-0.0237	-0.1578	0.0	-0.3534	-0.2164	0.2061	0.3102	0.1558	0.0630	0.0607
WC-----9	-0.1368	-0.2723	0.0	-0.3937	-0.2497	0.2957	0.2065	-0.1301	-0.0892	0.0785
WC----10	0.1467	-0.0555	0.0	-0.0807	-0.0543	0.2914	0.1904	-0.0224	-0.0841	-0.0997
WD----11	-0.0458	0.1837	0.0	-0.0427	0.0349	-0.2059	-0.3751	-0.2406	0.2922	0.1196
WC----12	0.0684	0.0547	0.0	-0.0511	-0.0473	0.0640	-0.3256	0.1672	0.3540	-0.0525
WC----13	-0.0343	0.2169	0.0	0.2010	0.0254	-0.1180	-0.2655	-0.1379	0.5142	-0.0857
WD----14	-0.0678	0.0016	0.0	-0.2496	0.0703	-0.0991	-0.0092	0.3402	0.1017	0.2391
WC----15	0.1433	-0.1719	0.0	-0.1658	0.1229	-0.0509	-0.1376	0.6172	-0.1380	0.1645
WC----16	-0.0849	0.0702	0.0	-0.2339	0.0784	-0.0960	0.0188	0.3815	0.0405	0.1899
WC----17	0.2025	-0.1481	0.0	0.0986	-0.0677	0.0029	0.2169	0.0333	0.0878	0.0253
WD----18	-0.0301	-0.2100	0.0	-0.3668	0.0677	0.0299	0.0986	0.1712	-0.0128	-0.1092
WC----19	0.0102	0.1313	0.0	-0.1517	0.0189	0.1752	0.2422	-0.1754	0.0064	0.0698
WD----20	0.0935	-0.0561	0.0	-0.1083	-0.0925	-0.1147	-0.0803	-0.0722	0.0826	-0.2619
WC----21	-0.0367	-0.0067	0.0	0.4288	-0.0430	-0.0759	-0.1184	-0.0886	0.2241	-0.1732
WC----22	0.2538	0.0230	0.0	-0.1151	0.3186	-0.1017	-0.2160	0.2376	-0.0313	0.1641
WC----23	-0.3339	-0.0491	0.0	0.0289	-0.1559	-0.1017	0.0709	-0.1188	0.2894	0.2860
WC----24	0.2202	0.0663	0.0	-0.2381	0.2713	-0.1238	-0.2597	0.3025	-0.0177	0.2142
WC----25	0.1341	0.0057	0.0	-0.1687	0.0463	-0.0942	-0.0820	0.3884	0.0447	-0.1645
WC----26	0.1859	-0.1578	0.0	-0.1530	-0.0117	-0.0444	-0.1794	0.6699	-0.0337	-0.1013
WC----27	0.2798	-0.1776	0.0	-0.2454	0.2590	-0.0780	-0.1794	0.4558	-0.0251	0.0139
WD----28	0.1334	0.1222	0.0	-0.1388	0.2469	0.1288	0.2124	-0.2434	-0.2037	0.1000
WC----29	-0.2033	-0.0207	0.0	-0.0096	-0.0439	-0.0954	-0.0835	-0.0708	0.0368	0.1016
WC----30	0.2114	0.0855	0.0	-0.0608	-0.0044	-0.0381	-0.1103	0.0992	-0.0694	-0.0483

Grade 2 Math (continued)

	RAMOS-11	RAMOS-12	RAMOS-13	RAMOS-14	RAMOS-15	RAMOS-16	RAMOS-17	RAMOS-18	RAMOS-19	RAMOS-20
RAMOS--1	0.3871	0.3907	0.0	0.4379	0.6105	0.0825	0.0390	0.0366	-0.0119	0.2560
RAMOS--2	0.1967	0.3264	0.0	0.5694	0.0814	0.1932	0.1733	0.2183	0.0015	0.0262
RAMOS--3	0.3742	-0.0903	0.0	0.0372	0.6401	-0.1076	-0.1026	-0.1603	0.0047	0.1403
RAMOS--4	-0.1591	0.6564	0.0	-0.0728	0.2424	0.0430	-0.0425	-0.0411	-0.1026	0.4345
RAMOS--5	0.3767	-0.0596	0.0	-0.0199	0.2201	-0.0367	-0.1245	-0.0429	0.3215	-0.0837
RAMOS--6	0.2769	0.1319	0.0	0.0912	0.1657	-0.0612	-0.0117	-0.0715	0.0911	-0.0657
RAMOS--7	0.2991	0.3219	0.0	0.2667	0.4527	-0.2119	0.0707	0.2414	0.0898	0.0500
RAMOS--8	0.2060	0.0813	0.0	0.0475	0.5138	0.1412	0.0328	-0.1301	-0.0550	0.2172
RAMOS--9	0.3089	0.3227	0.0	0.0298	0.7949	-0.0915	0.0684	0.2191	-0.0636	0.1966
RAMOS-10	0.4211	-0.0322	0.0	0.0677	0.0537	0.2043	0.0789	-0.1500	0.0863	0.0827
RAMOS-11	1.0000	-0.0213	0.0	0.1007	0.4717	-0.0885	-0.1491	0.2358	-0.0466	-0.1073
RAMOS-12	-0.0213	1.0000	0.0	0.2622	0.2529	-0.0011	-0.0385	-0.1078	-0.0717	0.2532
RAMOS-13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RAMOS-14	0.1007	0.2622	0.0	1.0000	-0.0794	-0.0881	-0.1535	-0.1029	0.0444	-0.0787
RAMOS-15	0.4717	0.2529	0.0	-0.0794	1.0000	-0.1786	-0.2369	0.0795	-0.1651	0.3124
RAMOS-16	-0.0885	-0.0011	0.0	-0.0881	-0.1786	1.0000	0.4167	-0.0299	-0.0748	-0.0585
RAMOS-17	-0.1491	-0.0385	0.0	-0.1535	-0.2369	0.4167	1.0000	-0.1205	-0.1831	-0.1254
RAMOS-18	0.2358	-0.1078	0.0	-0.1029	0.0795	-0.0299	-0.1205	1.0000	-0.0874	-0.0683
RAMOS-19	-0.0466	-0.0717	0.0	0.0444	-0.1651	-0.0748	-0.1831	-0.0874	1.0000	-0.1705
RAMOS-20	-0.1073	0.2532	0.0	-0.0787	0.3124	-0.0585	-0.1254	-0.0683	-0.1705	1.0000

	RAMOS-11	RAMOS-12	RAMOS-13	RAMOS-14	RAMOS-15	RAMOS-16	RAMOS-17	RAMOS-18	RAMOS-19	RAMOS-20
APPLE--1	0.1498	0.4201	0.0	0.7190	0.1344	0.0370	-0.1076	0.1027	-0.0240	-0.0804
APPLE--2	-0.1168	-0.1793	0.0	0.1278	-0.3569	-0.0347	-0.0765	-0.1477	0.1240	-0.2230
APPLE--3	0.1374	0.0297	0.0	-0.1056	0.1011	-0.0760	-0.0621	0.3715	-0.1780	0.3458
APPLE--4	-0.0730	-0.0012	0.0	-0.0286	-0.1608	0.0953	0.0610	0.1776	0.3045	-0.0867
APPLE--5	-0.0650	-0.0469	0.0	-0.1877	-0.1570	0.1158	-0.0966	-0.0746	-0.0877	-0.0747
APPLE--6	0.1880	0.4048	0.0	0.0446	-0.0579	0.1650	0.3077	-0.1268	-0.1378	0.1349
APPLE--7	0.0852	0.0333	0.0	-0.1155	0.4261	0.0101	-0.0919	0.1345	-0.0213	0.2835
APPLE--8	0.0500	0.1484	0.0	-0.1761	0.1246	-0.0872	0.0452	-0.1019	0.3568	0.0402
APPLE--9	0.1121	0.4386	0.0	0.1204	0.1319	-0.0096	0.0034	0.1732	0.1377	0.1114
APPLE-10	0.0881	-0.2264	0.0	-0.2020	0.1520	-0.1033	-0.1758	0.4386	-0.0586	-0.1346
APPLE-11	-0.0627	0.0794	0.0	-0.1535	-0.0019	-0.0116	0.1924	-0.1163	-0.1221	-0.0896
APPLE-12	-0.0672	-0.1302	0.0	-0.0549	-0.0728	-0.0088	0.1810	-0.0909	0.2458	-0.0579
APPLE-13	-0.0035	0.0015	0.0	0.0093	-0.1340	-0.0108	-0.1754	-0.0783	-0.1332	0.0342
APPLE-14	0.1436	0.0260	0.0	0.1110	0.3246	-0.0207	-0.1622	0.0446	-0.0246	0.2305
APPLE-15	0.1473	-0.1399	0.0	-0.1614	0.2089	0.0946	0.3444	-0.1642	0.0938	-0.0589
APPLE-16	-0.0129	-0.0013	0.0	-0.1524	0.0238	-0.1081	0.1788	-0.0430	0.0908	0.0604
APPLE-17	0.0463	-0.0912	0.0	-0.0059	0.0547	-0.0392	-0.1301	-0.0593	-0.0730	0.0576
APPLE-19	0.4103	0.0543	0.0	0.0003	0.2262	0.0662	-0.0839	0.1967	0.0763	0.0841
APPLE-20	-0.1553	0.0641	0.0	0.1458	-0.0871	0.0108	0.1202	-0.1453	0.0826	-0.1525
APPLE-21	0.1594	-0.1762	0.0	-0.1029	-0.0145	-0.0197	0.1166	0.4672	-0.1498	-0.0798
APPLE-22	0.1609	-0.0061	0.0	-0.1997	0.0983	0.1100	0.1145	-0.0655	0.0074	0.0444
APPLE-23	-0.1783	-0.0061	0.0	0.2011	-0.2005	-0.1090	-0.1277	-0.1273	0.0997	-0.2059
APPLE-24	0.0306	-0.0309	0.0	-0.1901	-0.1390	-0.0291	-0.1288	-0.1037	0.4628	-0.0736
APPLE-25	-0.0844	-0.0840	0.0	-0.0464	-0.2232	-0.0011	-0.1006	-0.0442	0.1251	-0.0862
APPLE-26	-0.0147	-0.0906	0.0	0.0095	-0.1126	0.0903	0.3342	-0.1213	0.0535	-0.1001
APPLE-27	-0.1606	-0.0896	0.0	0.1775	-0.2224	0.2527	0.0158	-0.0373	0.4446	-0.0728
APPLE-28	0.0997	0.0261	0.0	-0.1204	-0.1476	-0.0818	-0.0729	-0.0955	0.1200	-0.1864
APPLE-29	0.0567	0.1287	0.0	0.0852	0.1658	-0.0204	-0.1826	-0.1125	-0.0334	0.0449
APPLE-30	0.2399	-0.0738	0.0	-0.1147	0.4344	-0.0030	-0.1035	0.5506	-0.0920	0.3592

Grade 2 Math (continued)

	RAMOS-11	RAMOS-12	RAMOS-13	RAMOS-14	RAMOS-15	RAMOS-16	RAMOS-17	RAMOS-18	RAMOS-19	RAMOS-20
APPLE-31	-0.1456	0.1013	0.0	0.1235	-0.1741	-0.0288	-0.0661	-0.0336	-0.0840	-0.0656
APPLE-32	0.2217	-0.0665	0.0	0.2900	-0.1265	0.1153	0.2796	-0.0889	0.0271	0.0159
APPLE-33	0.2296	0.0340	0.0	0.2974	0.1677	0.0023	-0.0388	0.0099	0.0221	-0.1991
APPLE-34	-0.2328	-0.0666	0.0	0.1699	-0.0259	-0.0540	0.1337	-0.1227	0.0430	0.1261
APPLE-35	-0.1690	-0.0056	0.0	-0.1257	-0.1714	-0.0366	0.5972	-0.0427	-0.0993	-0.0834
APPLE-36	-0.0251	0.4143	0.0	0.4254	0.0069	-0.0604	0.0440	-0.0705	-0.1084	0.1395
APPLE-37	0.0951	-0.0807	0.0	-0.1163	-0.0848	-0.0827	-0.0468	0.1440	0.1089	0.0786
APPLE-38	-0.1776	0.1136	0.0	-0.0531	-0.1824	0.1103	-0.0086	-0.2193	0.0687	0.0598
APPLE-39	0.1015	0.0314	0.0	0.1338	0.0098	0.0572	-0.0267	-0.1076	-0.0285	-0.1744
APPLE-40	-0.2807	-0.0887	0.0	-0.2002	0.0315	0.0810	0.1843	-0.1101	0.0312	-0.0998
APPLE-41	0.1536	0.2735	0.0	-0.0532	0.1161	-0.0288	-0.1975	0.2257	0.0673	0.0521
APPLE-42	0.1683	-0.0344	0.0	-0.1481	-0.1240	0.0097	0.0953	-0.1310	0.1608	-0.1094
APPLE-43	0.1753	-0.0675	0.0	-0.0008	-0.0156	0.2148	0.2636	0.4618	-0.1091	-0.0945
APPLE-44	0.1652	-0.0721	0.0	-0.1134	0.2708	-0.0536	-0.0369	-0.0626	-0.0051	-0.0602
APPLE-45	0.0435	-0.1377	0.0	0.1136	0.0954	-0.1213	0.1047	0.1468	0.0171	0.2031
APPLE-46	0.0237	0.1788	0.0	0.1602	0.0276	-0.0702	0.0834	-0.1494	0.1090	-0.1750
APPLE-47	0.0262	-0.0618	0.0	-0.0594	-0.0678	0.3525	-0.0237	-0.0060	-0.0865	-0.0376
APPLE-48	-0.1357	-0.1106	0.0	-0.1307	-0.0778	-0.0086	-0.0586	-0.0567	-0.1099	0.0318
APPLE-49	-0.0860	0.0806	0.0	0.1817	-0.1435	0.0097	-0.1552	-0.0747	-0.0507	-0.1289
APPLE-50	0.0515	0.0612	0.0	0.0979	-0.0042	0.1572	0.1070	-0.1603	0.1927	0.0326
CATCH-ON	-0.2158	0.1967	0.0	0.0740	-0.1172	0.0711	-0.0180	-0.0617	0.1500	0.2466
CATCH-ON	-0.3017	-0.1390	0.0	-0.1162	-0.0546	-0.0954	-0.2162	-0.2588	-0.2647	0.1653
MTHAP-ON	-0.1430	0.0734	0.0	-0.2916	-0.0226	0.0581	0.1248	0.2106	-0.3550	0.3143
TOTMA-ON	-0.3153	0.0272	0.0	-0.2031	-0.0831	-0.0389	-0.0728	-0.0457	-0.3677	0.3440

	APPLE--1	APPLE--2	APPLE--3	APPLE--4	APPLE--5	APPLE--6	APPLE--7	APPLE--8	APPLE--9	APPLE-10
WC-----1	-0.1201	0.0429	-0.2100	-0.1409	0.1132	-0.1902	0.5524	-0.2177	0.0016	0.0893
WC-----2	-0.0819	0.1560	-0.2383	-0.2166	-0.1181	0.0064	-0.0333	-0.2575	-0.0341	0.1429
WC-----3	-0.1181	0.0242	0.1023	0.0139	-0.1793	-0.0897	-0.3137	0.0897	-0.0511	0.2712
WC-----4	-0.3317	0.0926	-0.0443	-0.1846	-0.0291	0.0302	0.1381	-0.1535	-0.1281	0.0359
WC-----5	0.1842	0.1359	-0.2966	-0.2921	-0.1796	0.1320	0.0033	-0.1546	0.1932	0.0777
WD-----6	0.4028	0.0048	0.0854	0.1210	-0.0714	-0.2311	0.2996	0.0888	0.0125	0.1302
WC-----7	0.2185	0.0181	-0.0786	-0.0893	-0.0945	-0.2571	0.3586	-0.0130	0.0653	0.0863
WC-----8	-0.2011	0.2725	0.1262	0.1742	0.3273	0.1927	-0.1437	0.1656	0.1537	-0.2646
WC-----9	-0.4230	0.1174	-0.2161	0.1215	0.1430	-0.0112	-0.1655	0.0098	-0.3170	-0.2420
WD----10	0.0152	0.2575	-0.0702	0.0377	0.1844	0.0799	-0.1639	-0.1286	0.0735	-0.1480
WC----11	0.0362	-0.0769	0.1499	-0.1295	0.1610	-0.0241	-0.2173	0.1151	-0.1214	-0.0822
WD----12	0.1599	-0.2037	0.0824	-0.0303	0.1073	-0.2173	-0.1793	0.0313	-0.1197	0.0697
WD----13	0.3430	-0.0825	-0.1405	0.0971	0.1061	-0.0175	0.0643	-0.0506	0.0375	-0.0253
WC----14	-0.0391	0.1055	-0.0945	-0.0697	-0.1430	0.0217	0.3241	-0.1653	0.0975	0.0694
WC----15	0.0193	0.1209	0.1920	0.1059	0.0199	-0.2171	0.0839	-0.1491	0.1234	0.1145
WD----16	0.0501	0.0178	-0.0316	-0.0199	-0.1099	0.0045	0.3726	-0.1566	0.2102	0.1476
WC----17	0.0444	0.0342	0.3305	0.1791	-0.1629	0.1475	-0.4388	0.1558	0.1575	-0.0739
WC----18	-0.1727	-0.0930	0.2271	0.0940	-0.0934	-0.1179	-0.0510	-0.0024	0.0672	0.2691
WC----19	-0.1126	-0.0717	0.0894	-0.1753	0.2043	0.4463	-0.0173	0.1310	0.0988	-0.2326
WC----20	-0.1544	0.0977	-0.0855	-0.1436	-0.0728	-0.2372	0.0465	0.1939	0.1967	0.1886
WC----21	0.2772	-0.1691	-0.2211	-0.2069	-0.1581	-0.2394	-0.1109	-0.1105	0.0160	0.0556
WD----22	-0.0771	-0.1093	-0.0064	0.0683	-0.1595	-0.2059	0.0291	-0.1954	0.1407	-0.0345
WD----23	-0.1475	-0.0947	0.0250	0.0340	0.1881	-0.1150	0.0493	0.1445	0.1995	-0.2207
WC----24	-0.0153	-0.0109	-0.0760	-0.1056	-0.0564	-0.0322	0.3427	-0.1391	0.0507	0.0314
WC----25	-0.0488	0.0766	-0.0224	-0.1170	0.0269	-0.1590	0.1809	0.0849	0.0668	0.1832
WC----26	0.0370	0.1881	0.2394	0.1679	0.0535	-0.1893	-0.0634	-0.0774	0.2082	0.1770
WC----27	-0.0582	-0.0322	0.2502	-0.0183	0.1084	-0.1839	0.3291	-0.1510	-0.0210	0.4220
WC----28	-0.1363	-0.1613	0.0043	-0.3677	0.0865	0.3148	0.1551	-0.0615	-0.0014	0.0780
WD----29	-0.0386	-0.1673	-0.2233	-0.1796	-0.1899	-0.2970	-0.0359	-0.1225	-0.1597	-0.2312
WD----30	0.0214	-0.1566	0.1651	0.0321	0.0903	0.0469	-0.3839	-0.2321	0.2252	-0.1958

Grade 2 Math (continued)

	APPLE--1	APPLE--2	APPLE--3	APPLE--4	APPLE--5	APPLE--6	APPLE--7	APPLE--8	APPLE--9	APPLE-10
RAMCS--1	0.5223	-0.2169	-0.1865	-0.1097	-0.3128	0.1267	0.1984	-0.0320	0.3040	-0.1598
RAMOS--2	0.6449	-0.1142	0.0008	0.0286	-0.1661	0.2815	0.0240	-0.0994	0.0627	-0.1042
RAMCS--3	0.0615	-0.1128	-0.2519	-0.1977	-0.2225	-0.2379	0.1797	0.0991	0.0848	-0.0547
RAMOS--4	-0.0493	-0.1434	-0.0072	0.0271	-0.0739	0.2800	0.1430	-0.1033	0.5816	-0.1416
RAMCS--5	0.0117	-0.0497	-0.0792	0.0286	-0.0461	-0.1555	0.1035	0.1208	0.1636	0.0916
RAMCS--6	-0.0713	0.0337	-0.0071	0.1154	0.1863	0.2793	-0.0589	0.0640	-0.0045	-0.0345
RAMOS--7	0.3005	-0.1683	-0.0031	0.0952	-0.3248	-0.0100	0.2428	0.0349	0.3847	0.1082
RAMCS--8	0.2096	-0.2322	-0.0939	-0.2397	-0.0813	0.0777	0.2219	0.0557	-0.0304	-0.1300
RAMOS--9	0.1987	-0.3094	-0.0101	-0.0151	-0.2697	0.0150	0.4507	0.0810	0.3149	0.0846
RAMOS-10	0.0466	-0.0341	0.2287	-0.1521	0.0155	0.2502	-0.0793	0.0536	0.0468	0.0313
RAMOS-11	0.1498	-0.1168	0.1374	-0.0730	-0.0650	0.1880	0.0852	0.0500	0.1121	0.0881
RAMOS-12	0.4201	-0.1793	0.0297	-0.0012	-0.0469	0.4048	0.0333	0.1484	0.4386	-0.2264
RAMOS-13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RAMOS-14	0.7190	0.1278	-0.1056	-0.0286	-0.1877	[illegible]	-0.1155	-0.1761	0.1204	-0.2020
RAMOS-15	0.1344	-0.3569	0.1011	-0.1608	-0.1570	[illegible]9	0.4261	0.1246	0.1319	0.1520
RAMOS-16	0.0370	-0.0347	-0.0760	0.0953	0.1158	0.1650	0.0101	-0.0872	-0.0096	-0.1033
RAMOS-17	-0.1076	-0.0765	-0.0621	0.0610	-0.0966	0.3077	-0.0919	0.0452	0.0034	-0.1758
RAMCS-18	0.1027	-0.1477	0.3715	0.1776	-0.0746	-0.1268	0.1345	-0.1019	0.1732	0.4386
RAMOS-19	-0.0240	0.1240	-0.1780	0.3045	-0.0877	-0.1378	-0.0213	0.3568	0.1377	-0.0586
RAMOS-20	-0.0804	-0.2230	0.3458	-0.0867	-0.0747	0.1349	0.2835	0.0402	0.1114	-0.1346

Grade 2 Math (continued)

	APPLE--1	APPLE--2	APPLE--3	APPLE--4	APPLE--5	APPLE--6	APPLE--7	APPLE--8	APPLE--9	APPLE-10
APPLE--1	1.0000	-0.1540	-0.0187	0.0420	-0.0901	-0.0251	0.0322	-0.0865	0.1691	-0.0587
APPLE--2	-0.1540	1.0000	-0.1348	0.2267	-0.0301	0.2230	-0.2517	-0.1212	0.0778	-0.2210
APPLE--3	-0.0187	-0.1348	1.0000	0.0549	0.0223	0.2099	-0.0294	0.2252	0.0191	0.2331
APPLE--4	0.0420	0.2267	0.0549	1.0000	-0.0763	-0.0384	-0.0708	0.0144	0.1658	-0.1115
APPLE--5	-0.0901	-0.0301	0.0223	-0.0763	1.0000	-0.0143	0.0325	-0.0059	-0.1282	-0.1496
APPLE--6	-0.0251	0.2230	0.2099	-0.0384	-0.0143	1.0000	-0.0737	0.1273	0.2040	-0.2092
APPLE--7	0.0322	-0.2517	-0.0294	-0.0708	0.0325	-0.0737	1.0000	-0.0171	0.0004	0.2483
APPLE--8	-0.0865	-0.1212	0.2252	0.0144	-0.0059	0.1273	-0.0171	1.0000	0.0370	-0.0384
APPLE--9	0.1691	0.0778	0.0191	0.1658	-0.1282	0.2040	0.0004	0.0370	1.0000	-0.0091
APPLE-10	-0.0587	-0.2210	0.2331	-0.1115	-0.1496	-0.2092	0.2483	-0.0384	-0.0091	1.0000
APPLE-11	-0.1210	-0.1787	0.0939	0.1182	-0.0656	0.2320	-0.2213	0.0932	-0.2749	0.2503
APPLE-12	-0.1211	-0.0257	0.1798	0.3326	-0.1597	-0.1409	-0.1513	-0.0808	-0.0509	0.0477
APPLE-13	-0.0852	0.2817	-0.1266	-0.0882	0.0499	-0.1335	-0.2450	-0.1033	0.0087	-0.1709
APPLE-14	0.2266	-0.2659	-0.1783	0.0478	-0.2314	-0.3131	0.6174	-0.2673	-0.0117	0.3325
APPLE-15	-0.1439	-0.0703	-0.1827	-0.1828	-0.1220	0.0826	-0.0742	0.1801	-0.3135	-0.2069
APPLE-16	-0.1009	-0.1882	0.0787	-0.1493	-0.1218	0.1090	-0.0423	0.1682	-0.1704	-0.1892
APPLE-17	-0.1034	-0.1689	-0.1087	-0.2135	0.0432	-0.0515	0.0257	-0.0814	-0.1075	-0.0259
APPLE-19	-0.0760	-0.0197	0.0535	0.1163	-0.1669	-0.0301	0.0931	0.0780	0.2507	-0.0723
APPLE-20	0.1354	-0.0769	-0.0523	0.2424	-0.1837	0.0195	0.1412	0.0282	0.1192	0.3055
APPLE-21	0.0339	-0.1345	0.1961	0.3629	-0.1236	-0.2102	0.0401	-0.1815	0.0152	0.2144
APPLE-22	-0.1135	0.2325	0.2227	-0.0493	0.2114	0.4052	-0.0865	0.0870	0.1045	-0.1208
APPLE-23	0.1290	0.0807	-0.1324	-0.0038	-0.0558	-0.0757	-0.2832	0.1004	-0.1924	0.0701
APPLE-24	-0.1381	0.2145	-0.1993	0.4184	0.0409	-0.1394	-0.1714	0.2285	0.2384	-0.0388
APPLE-25	-0.0598	0.4705	-0.1067	0.4525	-0.0162	-0.0021	-0.1498	-0.1202	-0.0050	-0.0558
APPLE-26	0.0630	0.2898	-0.0386	-0.1195	-0.0451	0.3073	-0.0563	0.1227	-0.0187	-0.1706
APPLE-27	-0.0306	0.2995	-0.0920	0.2551	-0.0277	-0.0598	0.0737	-0.1055	0.1275	-0.1248
APPLE-28	-0.1213	0.5031	-0.0895	0.0802	0.1421	0.2415	-0.1657	-0.0034	0.3183	-0.0680
APPLE-29	0.0747	-0.1472	-0.0814	-0.0770	0.5798	0.1097	0.0766	-0.1403	0.1087	-0.1183
APPLE-30	-0.0204	-0.1598	0.0945	-0.0846	-0.1115	-0.1553	0.6220	-0.2380	0.0742	0.2752

Grade 2 Math (continued)

	APPLE--1	APPLE--2	APPLE--3	APPLE--4	APPLE--5	APPLE--6	APPLE--7	APPLE--8	APPLE--9	APPLE-10
APPLE-31	-0.0477	0.1550	-0.0802	-0.1711	-0.0644	-0.1052	-0.1472	-0.0805	-0.1215	-0.0991
APPLE-32	0.0065	0.1483	0.1012	0.0060	-0.0801	0.5238	-0.0656	0.1651	0.0476	-0.0864
APPLE-33	0.3100	-0.2443	-0.1781	-0.1184	-0.1378	-0.2516	0.4906	0.0803	-0.0313	0.1879
APPLE-34	0.0411	0.2969	0.3566	0.1001	-0.0007	0.1399	0.1355	0.1663	0.0485	-0.1138
APPLE-35	-0.0606	0.0825	-0.0861	-0.0541	0.0127	0.1742	-0.0281	0.1628	0.1169	-0.0495
APPLE-36	0.5906	-0.1648	0.3725	0.0283	0.1484	0.2109	0.0193	0.1390	0.1316	-0.1097
APPLE-37	0.0498	0.0987	0.2933	0.1206	-0.1301	0.2420	-0.0992	0.0770	-0.0592	0.0102
APPLE-38	-0.0020	-0.0238	-0.1069	0.1491	-0.0385	0.1271	-0.2250	0.1171	-0.0459	-0.0078
APPLE-39	0.1848	0.2142	-0.0969	-0.1282	-0.0705	0.1534	0.0538	0.0379	-0.2730	-0.1795
APPLE-40	-0.1229	-0.0418	0.0604	0.0411	-0.0689	-0.0703	-0.1678	0.2489	-0.0199	0.4356
APPLE-41	0.0685	-0.3168	-0.1006	-0.0714	0.1459	-0.0580	0.1279	0.1060	0.1032	-0.0198
APPLE-42	-0.0379	-0.0408	0.2002	-0.0212	0.0129	0.3280	-0.1950	0.0519	-0.1561	0.1509
APPLE-43	0.0305	-0.1058	0.2007	0.1449	-0.1165	0.2046	-0.0400	-0.0299	0.1408	0.1340
APPLE-44	-0.0709	-0.0579	-0.0004	-0.0260	0.0351	0.0846	0.0332	0.0860	-0.0075	-0.0072
APPLE-45	-0.0342	0.2234	0.0978	0.4486	-0.1168	-0.0768	0.2323	0.0571	0.2120	-0.0594
APPLE-46	0.3212	-0.0696	-0.0337	-0.1685	-0.1103	0.2517	-0.1493	0.0869	-0.2390	-0.1255
APPLE-47	-0.0987	0.2559	-0.0228	0.1442	-0.0143	-0.1088	-0.2021	-0.2086	0.0270	-0.1074
APPLE-48	-0.0773	-0.0792	-0.0816	-0.1151	0.8480	-0.0767	0.1110	-0.0575	-0.1640	-0.1295
APPLE-49	0.0342	0.0811	-0.2419	-0.2912	-0.0275	-0.1879	-0.0929	-0.1142	0.0444	0.1725
APPLE-50	-0.1525	-0.0814	0.0080	-0.2126	-0.0489	0.1715	-0.1245	0.0689	0.3660	-0.1930
CATCH-ON	0.0310	0.1410	0.1221	0.0986	0.1870	0.0527	-0.0926	-0.1464	0.4163	-0.3754
CATCH-ON	-0.2494	0.1498	-0.2316	0.0904	0.0651	-0.1282	-0.1746	-0.0280	-0.3181	-0.1992
MTHAP-ON	-0.2107	-0.2699	0.3355	-0.0383	0.1305	-0.0040	-0.0258	-0.0214	0.0361	0.0293
TOTMA-ON	-0.2307	-0.0323	0.0598	0.0594	0.1634	-0.0884	-0.1789	-0.1300	-0.0380	-0.2397

Grade 2 Math (continued)

	APPLE-11	APPLE-12	APPLE-13	APPLE-14	APPLE-15	APPLE-16	APPLE-17	APPLE-19	APPLE-20	APPLE-21
WD-----1	-0.2397	-0.1091	0.2221	0.4098	0.0334	-0.1535	0.0861	-0.0892	-0.1011	-0.0403
WD-----2	0.0763	0.0687	0.0786	-0.0889	0.1705	0.1589	0.2473	-0.2922	0.0057	-0.0232
WD-----3	0.1345	0.2064	0.1175	-0.2062	-0.0225	-0.1192	-0.1392	-0.1346	0.0881	0.2571
WD-----4	0.0002	0.1409	-0.0052	-0.2290	0.1244	0.2834	-0.0024	-0.0999	-0.1159	-0.1385
WD-----5	-0.0168	-0.2190	-0.0232	0.2598	0.1128	0.0480	-0.0398	0.0083	0.0890	-0.2353
WD-----6	-0.2302	-0.1710	-0.1742	0.1913	-0.3220	-0.1200	-0.1493	-0.1570	0.2368	0.0349
WD-----7	-0.2683	-0.1748	0.1308	0.1501	-0.1797	-0.0099	-0.1586	-0.1488	0.0148	-0.0110
WD-----8	-0.2064	-0.0564	0.0353	-0.3202	0.1768	0.0169	-0.0021	-0.0366	-0.2650	0.1660
WD-----9	0.2186	0.0162	0.0822	-0.0528	0.2166	0.1029	0.2763	0.0813	-0.1883	0.1585
WD----10	-0.0602	0.0100	0.2834	-0.1100	0.0918	-0.3075	0.2260	-0.0601	-0.2673	0.1689
WD----11	0.0824	0.0992	0.0726	-0.1848	-0.0617	0.0063	0.0040	-0.4251	-0.0824	-0.1334
WD----12	0.0809	0.0952	-0.0001	-0.0162	0.0532	0.0479	-0.2067	-0.0120	-0.1816	-0.0463
WD----13	0.0350	0.1822	-0.2241	0.1994	0.0656	-0.0434	-0.1942	0.0307	0.1577	-0.2125
WD----14	-0.1854	-0.1646	0.1305	0.1055	0.1084	0.2004	-0.1215	0.0536	-0.1671	0.0632
WD----15	-0.1767	-0.1473	0.4669	0.1017	-0.0375	-0.1182	-0.0676	0.0262	-0.1909	0.2368
WD----16	-0.2263	-0.2173	0.1747	0.1663	0.0629	0.1283	-0.1306	0.0554	-0.0832	0.1068
WD----17	0.1239	0.1662	-0.1414	-0.2862	0.1092	0.1184	-0.1478	0.2472	0.0080	0.0656
WD----18	0.0776	0.0986	-0.0624	-0.0592	-0.1576	0.0039	0.0100	-0.0066	0.1437	0.2150
WD----19	-0.0090	-0.2222	-0.0998	-0.3861	0.1366	0.1225	-0.1119	0.0396	-0.2097	-0.2672
WD----20	-0.1306	0.1035	0.2468	0.1222	-0.2408	-0.1236	-0.0935	-0.0519	0.3613	-0.0439
WD----21	0.1235	-0.0930	-0.2092	0.1640	-0.0259	0.2795	-0.1670	0.1113	0.1630	-0.1840
WD----22	-0.2253	0.0408	-0.0413	0.2653	-0.1481	-0.1941	0.2392	0.3797	-0.3159	0.4157
WD----23	-0.1768	0.0149	-0.1313	-0.1929	-0.0266	0.1384	-0.1917	0.2612	-0.0008	-0.1703
WD----24	-0.1913	-0.2712	0.1146	0.1971	0.0980	0.0659	-0.1013	0.3571	-0.2120	0.0268
WD----25	-0.1634	-0.1827	0.3160	-0.0878	-0.1520	-0.0960	-0.0927	-0.1630	-0.2113	0.0619
WD----26	-0.1642	-0.1029	0.4986	-0.0778	-0.1273	-0.1212	-0.1280	0.0951	-0.1282	0.2629
WD----27	0.0053	0.1868	0.2090	0.1275	-0.1181	-0.2290	-0.0108	-0.0795	0.0866	0.1477
WD----28	0.1374	-0.0712	-0.1934	0.0718	0.2868	0.1425	-0.1032	0.0732	-0.1349	-0.2847
WD----29	-0.1675	-0.1065	-0.0463	0.0494	-0.1072	-0.0229	-0.1809	-0.0504	-0.1080	-0.1467
WD----30	0.0487	0.0135	0.0889	-0.2053	-0.0891	0.0729	-0.1177	-0.0767	-0.0652	-0.0112

Grade 2 Math (continued)

	APPLE-11	APPLE-12	APPLE-13	APPLE-14	APPLE-15	APPLE-16	APPLE-17	APPLE-19	APPLE-20	APPLE-21
RAMOS--1	-0.1207	-0.1448	-0.0687	0.2904	0.2671	-0.0641	0.0475	0.1923	-0.0426	-0.0263
RAMOS--2	0.0369	-0.1225	-0.1516	0.0957	0.2439	0.0476	-0.1191	-0.0474	0.0977	0.0108
RAMOS--3	-0.1699	-0.0875	0.0639	0.2833	0.2144	-0.1101	0.2079	0.1926	-0.2014	-0.0316
RAMOS--4	-0.0767	0.0271	0.0070	0.0154	-0.2014	-0.0499	-0.0330	0.2646	0.0637	-0.0755
RAMOS--5	-0.0481	0.0581	-0.0154	0.1774	-0.1675	-0.1079	0.0014	0.1059	0.1298	0.2399
RAMOS--6	0.2064	-0.0618	-0.0476	-0.1726	0.1092	-0.0029	0.0661	-0.1700	0.1128	-0.0938
RAMOS--7	-0.0600	0.1635	-0.1664	0.2469	0.1045	0.0079	0.0062	0.3166	0.1710	-0.0547
RAMOS--8	-0.0596	-0.2121	-0.1740	0.1669	0.4407	0.1657	0.1805	0.0003	-0.2643	-0.0401
RAMOS--9	-0.0131	-0.0313	-0.1623	0.3048	0.2322	-0.0684	0.0368	0.2738	-0.0545	-0.0056
RAMOS-10	-0.0628	0.0231	-0.0962	-0.0819	0.0893	0.1612	-0.0435	0.0054	0.0293	0.0005
RAMOS-11	-0.0627	-0.0672	-0.0035	0.1436	0.1473	-0.0129	0.0463	0.4103	-0.1550	0.1594
RAMOS-12	0.0794	-0.1302	0.0015	0.0260	-0.1399	-0.0013	-0.0912	0.0543	0.0641	-0.1762
RAMOS-13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RAMOS-14	-0.1535	-0.0549	0.0093	0.1110	-0.1614	-0.1524	-0.0059	0.0003	0.1458	-0.1029
RAMOS-15	-0.0019	-0.0728	-0.1340	0.3246	0.2089	0.0238	0.0547	0.2262	-0.0871	-0.0145
RAMOS-16	-0.0116	-0.0088	-0.0108	-0.0207	0.0946	-0.1081	-0.0394	0.0662	0.0108	-0.0197
RAMOS-17	0.1924	0.1810	-0.1754	-0.1422	0.3444	0.1788	-0.1301	-0.0839	0.1202	0.1166
RAMOS-18	-0.1163	-0.0909	-0.0783	0.0446	-0.1642	-0.0430	-0.0593	0.1967	-0.1453	0.4672
RAMOS-19	-0.1221	0.2458	-0.1332	-0.0246	0.0938	0.0908	-0.0730	0.0763	0.0826	-0.1498
RAMOS-20	-0.0896	-0.0579	0.0342	0.2305	-0.0589	0.0604	0.0576	0.0841	-0.1525	-0.0798

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Grade 2 Math (continued)

	APPLE-11	APPLE-12	APPLE-13	APPLE-14	APPLE-15	APPLE-16	APPLE-17	APPLE-19	APPLE-20	APPLE-21
APPLE--1	-0.1210	-0.1211	-0.0852	0.2266	-0.1439	-0.1009	-0.1034	-0.0760	0.1354	0.0339
APPLE--2	-0.1787	-0.0257	0.2817	-0.2659	-0.0703	-0.1882	-0.1689	-0.0197	-0.0769	-0.1345
APPLE--3	0.0939	0.1798	-0.1266	-0.1783	-0.1827	0.0787	-0.1087	0.0535	-0.0523	0.1761
APPLE--4	0.1182	0.3326	-0.0882	0.0478	-0.1828	-0.1493	-0.2135	0.1163	0.2424	0.3629
APPLE--5	-0.0656	-0.1597	0.0499	-0.2314	-0.1220	-0.1218	0.0432	-0.1669	-0.1837	-0.1236
APPLE--6	0.2320	-0.1409	-0.1335	-0.3131	0.0826	0.1090	-0.0515	-0.0301	0.0195	-0.2102
APPLE--7	-0.2213	-0.1513	-0.2450	0.6174	-0.0742	-0.0423	0.0257	0.0931	0.1412	0.0401
APPLE--8	0.0932	-0.0808	-0.1033	-0.2673	0.1801	0.1682	-0.0814	0.0780	0.0282	-0.1815
APPLE--9	-0.2749	-0.0509	0.0087	-0.0117	-0.3135	-0.1704	-0.1075	0.2507	0.1192	0.0152
APPLE-10	0.2503	0.0477	-0.1709	0.3325	-0.2069	-0.1892	-0.0259	-0.0723	0.3055	0.2144
APPLE-11	1.0000	0.2125	-0.1035	-0.0404	0.0806	0.1047	-0.0462	-0.2979	0.3264	0.0905
APPLE-12	0.2125	1.0000	-0.1124	-0.0400	-0.0349	-0.0765	-0.1366	-0.0195	0.3481	0.2271
APPLE-13	-0.1035	-0.1124	1.0000	-0.1615	-0.0175	-0.1830	0.1043	-0.1429	-0.1196	-0.0439
APPLE-14	-0.0404	-0.0400	-0.1615	1.0000	-0.1503	-0.1932	-0.0188	0.1623	0.2328	0.2207
APPLE-15	0.0806	-0.0349	-0.0175	-0.1503	1.0000	0.5341	0.1760	0.1374	-0.3014	-0.2059
APPLE-16	0.1047	-0.0765	-0.1830	-0.1932	0.5341	1.0000	0.0513	0.0574	-0.0902	-0.1679
APPLE-17	-0.0462	-0.1366	0.1043	-0.0188	0.1760	0.0513	1.0000	-0.1685	-0.1805	0.0133
APPLE-19	-0.2979	-0.0195	-0.1429	0.1623	0.1374	0.0574	-0.1685	1.0000	-0.2885	0.0276
APPLE-20	0.3264	0.3481	-0.1196	0.2328	-0.3014	-0.0902	-0.1805	-0.2885	1.0000	-0.0497
APPLE-21	0.0905	0.2271	-0.0439	0.2207	-0.2059	-0.1679	0.0133	0.0276	-0.0497	1.0000
APPLE-22	0.0282	-0.1931	0.0949	-0.3657	0.3770	0.1773	-0.0305	-0.0014	-0.4701	-0.2232
APPLE-23	0.2164	0.0828	-0.0556	-0.0850	-0.0031	0.1581	0.4515	-0.2198	0.3707	-0.1382
APPLE-24	-0.1275	-0.0301	0.2076	-0.0997	-0.0614	-0.1783	0.1155	0.0890	-0.0242	-0.1238
APPLE-25	-0.1455	-0.0930	-0.0942	-0.0614	-0.0912	-0.1256	-0.1041	0.2267	-0.1860	-0.0832
APPLE-26	-0.1565	-0.1347	0.1936	-0.2116	0.4144	0.1142	-0.1464	-0.1273	-0.1657	-0.1862
APPLE-27	-0.1011	0.3310	-0.0656	0.0907	-0.0003	-0.1373	-0.0849	0.1395	0.0080	-0.0606
APPLE-28	0.0406	-0.0314	0.1209	-0.1682	-0.0213	-0.1177	0.0023	-0.0664	-0.0010	-0.1785
APPLE-29	-0.0999	-0.1354	-0.0791	-0.1210	0.0880	0.0967	-0.0196	0.0097	-0.1003	-0.0889
APPLE-30	-0.1997	-0.0592	-0.1660	0.4965	-0.0128	0.0226	0.0655	0.1146	-0.2150	0.3231

Grade 2 Math (continued)

	APPLE-11	APPLE-12	APPLE-13	APPLE-14	APPLE-15	APPLE-16	APPLE-17	APPLE-19	APPLE-20	APPLE-21
APPLE-31	-0.1108	-0.0809	0.4369	-0.1340	-0.1556	-0.1154	-0.0808	-0.1094	-0.1871	-0.0620
APPLE-32	0.0387	-0.0468	-0.0471	-0.2170	0.1098	0.0566	-0.0570	0.0216	0.0758	-0.0685
APPLE-33	-0.2404	-0.0725	-0.1744	0.5109	-0.0390	-0.0681	0.0083	0.3934	0.1658	0.0880
APPLE-34	-0.1008	-0.0298	-0.2507	-0.0172	-0.0725	0.0883	-0.1023	-0.1144	0.0669	-0.0158
APPLE-35	-0.0337	-0.0698	-0.0760	-0.1467	0.1574	0.0576	-0.0703	-0.1229	-0.0356	-0.0515
APPLE-36	0.0456	-0.1052	-0.1335	-0.0004	-0.2586	0.0741	-0.1013	-0.1020	0.1076	-0.1349
APPLE-37	-0.1572	-0.0143	-0.1716	-0.0551	0.0977	0.2451	-0.0628	0.0987	-0.2478	0.0831
APPLE-38	0.4467	-0.1334	0.2425	-0.0267	0.0162	0.1742	0.3485	-0.2724	0.3698	-0.1278
APPLE-39	-0.1091	-0.1799	-0.1853	-0.0431	0.2557	0.2708	0.1544	0.1191	-0.0677	0.0068
APPLE-40	0.4748	0.1329	-0.1566	-0.0161	0.0713	-0.0649	-0.0338	-0.1775	0.1347	-0.1224
APPLE-41	-0.1574	-0.2715	-0.0427	0.0345	0.1840	0.2338	0.4880	0.3397	-0.2430	0.0594
APPLE-42	0.5742	0.2143	-0.1988	-0.0397	0.1253	0.1665	-0.1231	-0.1598	0.1014	0.1529
APPLE-43	0.0068	0.0012	-0.1094	-0.0758	0.1212	0.1872	0.0355	0.1224	-0.0291	0.1485
APPLE-44	0.1415	0.0154	-0.1113	-0.0874	0.1490	0.1388	0.1942	-0.0433	-0.1312	-0.0958
APPLE-45	-0.0898	0.0835	0.0682	0.1948	-0.1093	-0.1111	-0.2826	0.1806	0.1814	0.1752
APPLE-46	0.1646	-0.0428	-0.1470	-0.1474	0.5757	0.3649	0.3125	-0.2333	-0.0815	-0.1900
APPLE-47	-0.1357	0.2090	0.7089	-0.1035	-0.0022	-0.1745	-0.1384	0.0815	-0.0228	-0.0856
APPLE-48	-0.1279	-0.1073	-0.0934	-0.0972	-0.0976	-0.1030	-0.0537	-0.1179	-0.1937	-0.1018
APPLE-49	-0.0700	-0.1591	0.6757	0.0962	-0.1225	-0.1981	0.2514	-0.0535	-0.0001	-0.1369
APPLE-50	-0.0679	0.0003	-0.1736	-0.2156	0.0250	0.2451	0.1383	0.0930	-0.0075	-0.1799
CATCH-GN	-0.3153	0.1254	-0.0151	-0.1378	-0.1430	0.1075	0.0236	-0.0094	-0.0805	0.0173
CATCH-GN	0.1070	-0.1490	0.1237	-0.0014	-0.1241	-0.2518	0.2469	-0.2112	-0.0873	0.1114
MTHAP-GN	-0.0941	-0.0467	-0.0134	-0.0722	-0.2632	0.0107	0.1012	-0.1442	-0.1533	0.3969
TCTHA-GN	-0.0834	-0.0603	0.0826	-0.0832	-0.2714	-0.1336	0.2298	-0.2035	-0.2018	0.3617

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Grade 2 Math (continued)

	APPLE-22	APPLE-23	APPLE-24	APPLE-25	APPLE-26	APPLE-27	APPLE-28	APPLE-29	APPLE-30	APPLE-31
WD-----1	0.0547	-0.2962	0.0782	-0.0675	-0.0179	0.2380	0.0862	-0.0191	0.6695	-0.0973
WD-----2	0.0902	0.1671	0.0975	0.0168	0.0160	0.0436	0.2780	-0.1797	0.3214	-0.1951
WD-----3	-0.0763	0.0561	0.2223	0.0450	0.0245	-0.0454	0.0498	-0.2419	-0.1373	-0.2180
WD-----4	0.2381	-0.1622	-0.0128	-0.1043	-0.0152	0.0030	0.2116	-0.1419	0.3521	-0.0343
WD-----5	-0.1009	0.1066	-0.1670	0.1368	0.0218	0.1094	0.2635	-0.1373	0.1587	-0.1287
WD-----6	-0.2626	0.1189	-0.0635	0.0677	0.0422	-0.0968	-0.1623	-0.1839	0.1339	-0.0770
WD-----7	-0.0558	-0.0593	0.1783	-0.0153	0.1971	-0.1386	-0.0898	-0.2275	0.3246	-0.1036
WD-----8	0.2828	-0.0474	0.1725	0.2104	0.3936	0.1390	0.1902	0.0232	0.1031	-0.3568
WD-----9	-0.1282	0.2893	0.1887	0.2935	-0.1030	-0.0264	0.1026	-0.2024	-0.0350	-0.1089
WD----10	0.1972	0.0528	0.1151	0.2094	0.2876	0.2200	0.2049	-0.1232	0.0548	-0.1963
WD----11	0.1065	0.0262	0.0962	-0.2576	-0.0583	-0.0521	0.1484	0.1214	-0.1958	0.1910
WD----12	0.0793	-0.0723	-0.0391	-0.2651	0.0070	0.2108	0.0121	-0.0182	0.0348	0.0291
WD----13	0.0329	0.0447	-0.0858	-0.1429	0.1146	0.3493	0.0905	0.2596	-0.1572	-0.1283
WD----14	0.1304	-0.1534	0.0642	0.2425	0.3368	-0.1274	-0.1251	-0.0742	0.4307	-0.0861
WD----15	0.0515	-0.1768	0.1098	-0.0620	0.0938	-0.0617	0.1011	-0.1784	0.4644	-0.0556
WD----16	0.0812	-0.1618	0.0127	0.0910	0.3208	-0.1160	-0.0973	0.0093	0.3350	-0.0724
WD----17	0.0450	0.1202	-0.0581	0.2248	0.0373	0.1154	-0.0397	-0.1012	-0.2506	-0.1896
WD----18	-0.1453	0.0863	0.0782	0.2587	-0.2740	-0.1609	-0.0260	-0.2050	-0.0740	0.0522
WD----19	0.4818	-0.3642	0.0468	-0.1558	0.1530	-0.0911	0.0855	0.2845	-0.3040	0.1837
WD----20	-0.2939	0.0569	0.3464	-0.0757	-0.1999	-0.1384	0.3129	-0.2900	-0.0537	0.2169
WD----21	-0.1684	0.1676	0.0124	-0.1001	-0.0939	-0.0997	-0.1406	0.0053	-0.0682	-0.0899
WD----22	-0.3189	0.0292	0.1155	0.2306	-0.3015	-0.1228	-0.1910	-0.0496	0.3314	-0.0939
WD----23	0.0353	-0.1422	0.0561	-0.1233	0.0145	0.2243	-0.1190	0.2550	-0.1535	-0.0833
WD----24	-0.0089	-0.1874	0.0274	0.2251	-0.0609	-0.1491	0.0784	-0.0260	0.3030	-0.1344
WD----25	0.1537	-0.2528	0.2455	-0.1219	0.1872	-0.1214	0.0741	-0.2486	0.3188	0.3271
WD----26	0.1260	-0.1386	0.2258	-0.0540	0.1416	-0.0538	0.1594	-0.1540	0.2410	-0.0485
WD----27	0.0290	-0.1374	0.1623	-0.0948	-0.1163	-0.0944	0.1994	-0.1574	0.4189	-0.0851
WD----28	0.3666	-0.3611	-0.3832	-0.2126	0.0373	0.1620	0.1513	0.2314	0.0812	0.1370
WD----29	-0.3151	-0.1217	-0.0006	0.0477	-0.1702	-0.0372	-0.1876	-0.2380	0.0216	-0.0311
WD----30	0.1782	-0.2361	-0.0077	-0.1425	0.0230	-0.1605	0.0362	0.1576	-0.1051	-0.0422

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Grade 2 Math (continued)

	APPLE-22	APPLE-23	APPLE-24	APPLE-25	APPLE-26	APPLE-27	APPLE-28	APPLE-29	APPLE-30	APPLE-31
RAMCS--1	-0.0278	-0.1114	-0.1419	-0.2075	0.0803	-0.0309	-0.1715	0.1767	0.3267	-0.1027
RAMOS--2	-0.0133	-0.0060	-0.3129	-0.2175	0.1532	0.1294	-0.0332	0.0966	0.1304	-0.0286
RAMCS--3	0.0002	-0.0920	0.1229	-0.0314	0.0114	-0.1679	-0.1613	0.0277	0.2815	-0.0921
RAMCS--4	-0.0366	-0.1249	-0.0133	-0.0491	-0.1166	-0.0221	-0.0942	0.2537	0.0589	-0.0395
RAMOS--5	-0.1176	-0.0145	0.2669	-0.0542	-0.1488	-0.0457	-0.0042	0.0281	0.1177	-0.0412
RAMOS--6	0.1944	0.0037	0.1065	-0.0903	-0.0565	-0.0762	0.2070	0.2089	-0.0993	-0.0687
RAMOS--7	-0.1807	0.0753	0.0339	-0.1117	-0.0719	0.1244	-0.0287	-0.1103	0.3069	-0.0441
RAMOS--8	0.2945	-0.2065	-0.2615	-0.1378	0.1640	-0.0686	-0.1500	0.2701	0.2562	-0.1250
RAMOS--9	0.0964	-0.2444	-0.1343	-0.2361	0.0568	0.0593	-0.1527	0.0167	0.4788	-0.1342
RAMOS-10	0.2459	-0.1474	0.0568	0.0042	-0.0182	-0.0794	0.1383	0.1269	-0.0264	0.0012
RAMCS-11	0.1609	-0.1783	0.0306	-0.0844	-0.0147	-0.1606	0.0997	0.0567	0.2399	-0.1456
RAMOS-12	-0.0061	-0.0061	-0.0309	-0.0840	-0.0906	-0.0896	0.0261	0.1287	-0.0738	0.1013
RAMOS-13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RAMCS-14	-0.1997	0.2011	-0.1901	-0.0464	0.0095	0.1775	-0.1204	0.0852	-0.1147	0.1235
RAMOS-15	0.0983	-0.2005	-0.1390	-0.2232	-0.1126	-0.2224	-0.1476	0.1658	0.4344	-0.1741
RAMOS-16	0.1100	-0.1090	-0.0291	-0.0011	0.0903	0.2527	-0.0818	-0.0204	-0.0030	-0.0288
RAMCS-17	0.1145	-0.1277	-0.1288	-0.1006	0.3342	0.0158	-0.0729	-0.1826	-0.1035	-0.0661
RAMOS-18	-0.0655	-0.1273	-0.1037	-0.0442	-0.1213	-0.0373	-0.0955	-0.1125	0.5506	-0.0336
RAMOS-19	0.0074	0.0997	0.4628	0.1251	0.0535	0.4446	0.1200	-0.0334	-0.0920	-0.0840
RAMOS-20	0.0444	-0.2059	-0.0736	-0.0862	-0.1001	-0.0728	-0.1864	0.0449	0.3592	-0.0656

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Grade 2 Math (continued)

	APPLE-22	APPLE-23	APPLE-24	APPLE-25	APPLE-26	APPLE-27	APPLE-28	APPLE-29	APPLE-30	APPLE-31
APPLE--1	-0.1135	0.1290	-0.1381	-0.0598	0.0630	-0.0306	-0.1213	0.0747	-0.0204	-0.0477
APPLE--2	0.2325	0.0807	0.2145	0.4705	0.2898	0.2995	0.5031	-0.1472	-0.1598	0.1550
APPLE--3	0.2227	-0.1324	-0.1993	-0.1067	-0.0386	-0.0920	-0.0895	-0.0814	0.0945	-0.0802
APPLE--4	-0.0493	-0.0038	0.4184	0.4525	-0.1195	0.2551	0.0802	-0.0770	-0.0846	-0.1711
APPLE--5	0.2114	-0.0558	0.0409	-0.0162	-0.0451	-0.0277	0.1421	0.5798	-0.1115	-0.0644
APPLE--6	0.4052	-0.0757	-0.1394	-0.0021	0.3073	-0.0598	0.2415	0.1097	-0.1553	-0.1052
APPLE--7	-0.0865	-0.2832	-0.1714	-0.1498	-0.0563	0.0737	-0.1657	0.0766	0.6220	-0.1472
APPLE--8	0.0870	0.1004	0.2285	-0.1202	0.1227	-0.1055	-0.0034	-0.1403	-0.2380	-0.0805
APPLE--9	0.1045	-0.1924	0.2384	-0.0050	-0.0187	0.1275	0.3183	0.1087	0.0742	-0.1215
APPLE-10	-0.1208	0.0701	-0.0388	-0.0558	-0.1706	-0.1248	-0.0680	-0.1183	0.2752	-0.0991
APPLE-11	0.0282	0.2164	-0.1275	-0.1455	-0.1565	-0.1011	0.0406	-0.0999	-0.1997	-0.1108
APPLE-12	-0.1931	0.0828	-0.0301	-0.0930	-0.1347	0.3310	-0.0314	-0.1354	-0.0592	-0.0809
APPLE-13	0.0949	-0.0556	0.2076	-0.0942	0.1936	-0.0656	0.1209	-0.0791	-0.1660	0.4369
APPLE-14	-0.3657	-0.0850	-0.0997	-0.0614	-0.2116	0.0907	-0.1682	-0.1210	0.4965	-0.1340
APPLE-15	0.3770	-0.0031	-0.0614	-0.0912	0.4144	-0.0003	-0.0213	0.0880	-0.0128	-0.1556
APPLE-16	0.1773	0.1581	-0.1793	-0.1256	0.1142	-0.1373	-0.1177	0.0967	0.0226	-0.1154
APPLE-17	-0.0305	0.4515	0.1155	-0.1041	-0.1464	-0.0849	0.0023	-0.0196	0.0655	-0.0808
APPLE-19	-0.0014	-0.2198	0.0890	0.2267	-0.1273	0.1395	-0.0664	0.0097	0.1146	-0.1094
APPLE-20	-0.4701	0.3707	-0.0242	-0.1860	-0.1657	0.0080	-0.0010	-0.1003	-0.2150	-0.1871
APPLE-21	-0.2232	-0.1382	-0.1238	-0.0832	-0.1862	-0.0606	-0.1785	-0.0889	0.3231	-0.0620
APPLE-22	1.0000	-0.4768	0.1235	0.1007	0.5562	0.0756	0.3199	0.2207	-0.0542	-0.1300
APPLE-23	-0.4768	1.0000	0.0637	0.0347	-0.1990	-0.0690	-0.0217	-0.1537	-0.2929	-0.1184
APPLE-24	0.1235	0.0637	1.0000	0.5535	-0.1005	-0.0910	0.3689	-0.1966	-0.2360	-0.0863
APPLE-25	0.1007	0.0347	0.5535	1.0000	-0.0925	-0.0357	0.1500	-0.1284	-0.0975	-0.0414
APPLE-26	0.5562	-0.1990	-0.1005	-0.0925	1.0000	0.0287	-0.0404	0.0540	-0.1362	-0.0551
APPLE-27	0.0756	-0.0690	-0.0910	-0.0357	0.0287	1.0000	0.2177	-0.0955	0.1452	-0.0349
APPLE-28	0.3199	-0.0217	0.3689	0.1500	-0.0404	0.2177	1.0000	-0.1492	-0.1289	-0.0873
APPLE-29	0.2207	-0.1537	-0.1966	-0.1284	0.0540	-0.0955	-0.1492	1.0000	-0.0897	-0.0909
APPLE-30	-0.0542	-0.2929	-0.2360	-0.0975	-0.1362	0.1452	-0.1289	-0.0897	1.0000	-0.0947

Grade 2 Math (continued)

	APPLE-22	APPLE-23	APPLE-24	APPLE-25	APPLE-26	APPLE-27	APPLE-28	APPLE-29	APPLE-30	APPLE-31
APPLE-31	-0.1300	-0.1184	-0.0863	-0.0414	-0.0551	-0.0349	-0.0873	-0.0909	-0.0947	1.0000
APPLE-32	0.1935	-0.0274	-0.0677	-0.0973	0.4218	-0.0393	-0.0910	0.2312	-0.1547	-0.0503
APPLE-33	-0.3101	-0.0073	-0.0330	-0.1150	-0.1053	-0.0809	-0.1600	-0.1156	0.1019	-0.0891
APPLE-34	0.2176	-0.0006	-0.2646	-0.0534	0.3826	0.1843	-0.0584	0.0020	0.0138	-0.0826
APPLE-35	0.1971	-0.0092	-0.0104	-0.0376	0.5733	-0.0444	0.0225	-0.1194	-0.0923	0.0345
APPLE-36	0.1164	-0.0110	-0.0876	0.0399	-0.0712	-0.0732	-0.0602	0.0495	-0.1284	-0.0660
APPLE-37	0.2970	-0.1117	-0.0490	0.3250	0.2400	-0.1001	-0.1133	0.0436	-0.0134	-0.0303
APPLE-38	-0.0762	0.5821	0.2590	-0.1166	-0.0465	-0.0778	0.0809	-0.1166	-0.3944	-0.1141
APPLE-39	-0.0692	0.3711	-0.2206	0.1797	0.1322	-0.1090	-0.1811	-0.0231	-0.0437	-0.1416
APPLE-40	0.1969	0.1712	0.0140	0.0499	0.1627	0.1157	-0.0482	-0.0940	-0.1496	-0.0645
APPLE-41	-0.1130	0.3252	0.1378	0.0222	-0.1765	-0.1478	-0.1843	0.1747	0.0963	-0.1518
APPLE-42	0.1708	0.0609	-0.1064	-0.1531	0.0059	0.0241	0.2801	0.0584	-0.2186	-0.1221
APPLE-43	0.1901	-0.1495	-0.1577	-0.0348	0.0561	-0.0069	-0.1399	0.1136	0.1751	-0.0775
APPLE-44	0.3998	-0.1327	-0.0183	-0.0373	0.0143	-0.0650	0.0803	0.2205	-0.0345	-0.0586
APPLE-45	-0.0350	-0.2342	0.1608	0.1384	-0.0307	0.1052	0.0778	-0.1413	0.2249	0.1013
APPLE-46	0.2553	0.3086	-0.1182	-0.0150	0.3831	-0.1465	-0.0087	0.0679	-0.1818	-0.1306
APPLE-47	0.1071	-0.1828	0.1083	-0.0074	0.1314	0.2335	0.1036	-0.0819	-0.1047	0.4359
APPLE-48	0.0460	-0.0935	-0.1088	0.0135	-0.0798	-0.0478	-0.0989	0.6223	0.0388	-0.0439
APPLE-49	-0.1218	0.2019	0.1473	-0.1437	0.1140	-0.0954	-0.0644	-0.0967	-0.1477	0.4349
APPLE-50	0.2011	-0.0856	0.0217	-0.1685	-0.0344	0.1351	0.1268	0.0641	-0.0065	-0.1408
CATCN-GN	-0.0113	-0.0558	-0.0393	0.0395	-0.2639	0.3643	0.3178	0.1811	0.1070	-0.0100
CATCP-GN	-0.1828	0.2141	0.0505	0.0247	-0.1027	-0.1659	-0.0128	-0.0178	-0.2116	-0.0478
MTHAP-GN	-0.2407	-0.0964	-0.1056	-0.0342	-0.3938	-0.2427	-0.1520	-0.0356	0.2408	0.0579
TOTMA-GN	-0.2744	0.0514	-0.0567	0.0059	-0.3904	-0.1520	0.0083	0.0341	0.0370	0.0068

	APPLE-32	APPLE-33	APPLE-34	APPLE-35	APPLE-36	APPLE-37	APPLE-38	APPLE-39	APPLE-40	APPLE-41
WD-----1	-0.0919	0.0962	-0.0691	-0.1313	-0.1509	-0.2250	-0.2208	-0.1860	-0.1615	-0.0959
WD-----2	0.0000	-0.1425	-0.1954	-0.1046	-0.2085	-0.1255	-0.0147	0.0085	0.0112	-0.1338
WD-----3	-0.0815	-0.1959	-0.3208	-0.1470	-0.2483	0.0274	0.0269	0.0135	0.0479	-0.0967
WD-----4	-0.0143	-0.1618	-0.1544	-0.0663	-0.2534	-0.1288	-0.1942	-0.1584	-0.0880	-0.2599
WD-----5	0.0015	0.1260	0.0220	0.0177	0.2048	-0.0626	-0.0555	0.0086	0.0725	-0.1419
WD-----6	-0.1683	0.2763	0.2650	0.0163	0.1609	-0.1029	-0.0532	0.2650	-0.1454	0.0235
WD-----7	-0.1673	0.2077	0.0499	0.1064	0.0034	-0.1829	-0.0793	0.0910	-0.2190	0.0429
WD-----8	0.0634	-0.4160	0.1765	0.3610	-0.1130	0.0922	-0.0008	0.1464	-0.0774	0.1153
WD-----9	-0.1091	-0.0859	-0.1476	0.0925	-0.3941	-0.1345	0.3256	0.2186	-0.0175	0.2840
WD----10	-0.0171	-0.1473	0.0380	0.2722	-0.1178	-0.1419	0.0268	0.1510	0.0371	0.1263
WD----11	-0.1881	-0.3397	0.0166	-0.2299	-0.0397	0.1101	0.0657	-0.0764	0.0064	-0.0807
WD----12	-0.3412	-0.1425	-0.1610	-0.2847	-0.1010	0.0826	-0.0250	-0.0474	0.0599	0.0843
WD----13	-0.1765	0.0391	0.0055	-0.1246	0.0648	0.1744	0.0230	0.0771	0.0508	0.0698
WD----14	-0.1223	-0.0294	-0.0427	0.2111	-0.2192	0.1416	-0.0354	0.2429	-0.1982	0.2880
WD----15	-0.1471	-0.1550	-0.1021	-0.0707	-0.1112	0.0153	-0.0692	-0.2173	-0.1731	-0.0305
WD----16	-0.1013	0.0340	-0.0464	0.2671	-0.1661	0.1495	-0.0160	0.1181	-0.1471	0.3216
WD----17	0.1088	-0.2313	0.1305	0.0492	0.1342	0.1395	0.0890	0.1561	0.0718	-0.0126
WD----18	-0.3432	-0.0373	-0.0213	-0.0114	0.0131	0.1261	0.0661	0.1182	0.0687	0.0846
WD----19	0.2164	-0.1599	-0.0304	0.0995	0.0931	0.1206	0.0267	-0.0872	-0.0497	-0.0311
WD----20	-0.1479	0.2414	-0.1798	0.0041	-0.1373	-0.1496	-0.0963	-0.1829	-0.0160	-0.1128
WD----21	0.0432	0.3293	0.0226	-0.1142	0.1040	-0.2410	0.0840	0.0283	-0.0010	0.0010
WD----22	-0.1552	0.0832	-0.1553	-0.1407	-0.2049	-0.0315	-0.1517	0.0817	-0.2651	0.3134
WD----23	0.0964	-0.0062	0.2468	0.2004	0.0670	-0.1658	-0.0159	-0.1452	-0.0245	0.0938
WD----24	-0.3304	0.1845	-0.2503	-0.1708	-0.2265	0.0944	-0.0772	0.3087	-0.4184	0.3701
WD----25	-0.1068	0.1033	-0.0242	0.2468	-0.1736	-0.1958	-0.1872	-0.1261	-0.0632	0.0452
WD----26	-0.1041	-0.0983	-0.1144	-0.0616	-0.0903	0.0455	-0.0103	-0.1766	-0.1510	0.0194
WD----27	-0.1787	0.1001	-0.1662	-0.1082	-0.1573	-0.1159	-0.1867	-0.1606	-0.1084	-0.0216
WD----28	0.0645	-0.1387	-0.1233	0.0734	0.0854	0.1061	-0.2275	-0.2116	0.2498	-0.1816
WD----29	-0.2184	-0.0158	-0.1770	-0.0603	-0.1391	-0.1868	-0.1615	-0.0805	-0.2498	-0.0869
WD----30	-0.1758	-0.4157	-0.1182	-0.2139	0.0656	0.0331	-0.0110	-0.1341	-0.2348	-0.0924

Grade 2 Math (continued)

	APPLE-32	APPLE-33	APPLE-34	APPLE-35	APPLE-36	APPLE-37	APPLE-38	APPLE-39	APPLE-40	APPLE-41
RAMOS--1	0.2130	0.1343	-0.0576	-0.0673	0.1181	-0.1106	-0.0953	0.0740	-0.1552	0.0679
RAMOS--2	0.2362	0.0729	0.0349	-0.0514	0.2444	-0.0149	0.0016	0.1621	-0.2361	-0.0137
RAMOS--3	0.0610	0.1524	-0.0620	-0.0128	-0.0725	-0.0811	-0.1715	-0.0372	0.0889	-0.0228
RAMOS--4	-0.0566	-0.1103	-0.1205	-0.0502	-0.0441	-0.1087	0.0742	-0.0700	-0.1110	0.2983
RAMOS--5	0.1297	0.0913	-0.0224	-0.0524	-0.0529	-0.1185	0.0520	-0.0170	-0.0514	-0.0196
RAMOS--6	0.1592	-0.0489	0.1130	-0.0873	-0.0575	-0.1592	0.1510	0.0184	-0.1125	-0.0077
RAMOS--7	0.0417	0.2575	-0.0816	0.1667	0.1311	-0.3514	-0.0920	-0.1334	-0.0436	0.2125
RAMOS--8	0.0370	-0.0316	0.0944	-0.0953	0.0218	0.3478	-0.1679	0.1871	0.1293	0.0013
RAMOS--9	-0.0344	0.1709	0.0231	0.1058	0.0508	-0.2149	-0.1957	-0.1293	0.1100	0.1215
RAMOS-10	0.2891	-0.0833	0.0311	-0.0882	0.1050	0.2593	-0.0508	0.0758	-0.0916	-0.1488
RAMOS-11	0.2217	0.2296	-0.2328	-0.1690	-0.0251	0.0951	-0.1776	0.1015	-0.2807	0.1536
RAMOS-12	-0.0665	0.0340	-0.0666	-0.0056	0.4143	-0.0807	0.1136	0.0314	-0.0887	0.2735
RAMOS-13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RAMOS-14	0.2900	0.2974	0.1699	-0.1257	0.4254	-0.1163	-0.0531	0.1338	-0.2002	-0.0532
RAMOS-15	-0.1265	0.1677	-0.0259	-0.1714	0.0069	-0.0848	-0.1824	0.0098	0.0315	0.1161
RAMOS-16	0.1153	0.0023	-0.0540	-0.0366	-0.0604	-0.0827	0.1103	0.0572	0.0810	-0.0288
RAMOS-17	0.2796	-0.0388	0.1337	0.5972	0.0440	-0.0468	-0.0086	-0.0267	0.1843	-0.1975
RAMOS-18	-0.0889	0.0099	-0.1227	-0.0427	-0.0705	0.1440	-0.2193	-0.1076	-0.1101	0.2257
RAMOS-19	0.0271	0.0221	0.0430	-0.0993	-0.1084	0.1089	0.0687	-0.0285	0.0312	0.0673
RAMOS-20	0.0159	-0.1991	0.1261	-0.0834	0.1395	0.0786	0.0598	-0.1744	-0.0998	0.0521

	APPLE-32	APPLE-33	APPLE-34	APPLE-35	APPLE-36	APPLE-37	APPLE-38	APPLE-39	APPLE-40	APPLE-41
APPLE--1	0.0065	0.3100	0.0411	-0.0606	0.5906	0.0498	-0.0020	0.1848	-0.1229	0.0685
APPLE--2	0.1483	-0.2443	0.2969	0.0825	-0.1648	0.0987	-0.0238	0.2142	-0.0418	-0.3168
APPLE--3	0.1012	-0.1781	0.3566	-0.0861	0.3725	0.2933	-0.1069	-0.0969	0.0604	-0.1006
APPLE--4	0.0060	-0.1184	0.1001	-0.0541	0.0283	0.1206	0.1491	-0.1282	0.0411	-0.0714
APPLE--5	-0.0801	-0.1378	-0.0007	0.0127	0.1484	-0.1301	-0.0385	-0.0705	-0.0689	0.1459
APPLE--6	0.5238	-0.2516	0.1399	0.1742	0.2109	0.2420	0.1271	0.1534	-0.0703	-0.0580
APPLE--7	-0.0656	0.4906	0.1355	-0.0281	0.0193	-0.0992	-0.2250	0.0538	-0.1678	0.1279
APPLE--8	0.1651	0.0803	0.1663	0.1628	0.1390	0.0770	0.1171	0.0379	0.2489	0.1060
APPLE--9	0.0476	-0.0313	0.0485	0.1169	0.1316	-0.0592	-0.0459	-0.2730	-0.0199	0.1032
APPLE-10	-0.0864	0.1879	-0.1138	-0.0495	-0.1097	0.0102	-0.0078	-0.1795	0.4356	-0.0198
APPLE-11	0.0387	-0.2404	-0.1008	-0.0337	0.0456	-0.1572	0.4467	-0.1091	0.4748	-0.1574
APPLE-12	-0.0468	-0.0725	-0.0298	-0.0698	-0.1052	-0.0143	-0.1334	-0.1799	0.1329	-0.2715
APPLE-13	-0.0471	-0.1744	-0.2507	-0.0760	-0.1335	-0.1716	0.2425	-0.1853	-0.1566	-0.0427
APPLE-14	-0.2170	0.5109	-0.0172	-0.1467	-0.0004	-0.0551	-0.0267	-0.0431	-0.0161	0.0345
APPLE-15	0.1098	-0.0390	-0.0725	0.1574	-0.2586	0.0977	0.0162	0.2557	0.0713	0.1840
APPLE-16	0.0566	-0.0681	0.0883	0.0576	0.0741	0.2451	0.1742	0.2708	-0.0649	0.2338
APPLE-17	-0.0570	0.0083	-0.1023	-0.0703	-0.1013	-0.0628	0.3485	0.1544	-0.0338	0.4880
APPLE-19	0.0216	0.3934	-0.1144	-0.1229	-0.1020	0.0987	-0.2724	0.1191	-0.1775	0.3397
APPLE-20	0.0758	0.1658	0.0669	-0.0356	0.1076	-0.2478	0.3698	-0.0677	0.1347	-0.2430
APPLE-21	-0.0685	0.0680	-0.0158	-0.0515	-0.1349	0.0831	-0.1278	0.0068	-0.1224	0.0594
APPLE-22	0.1935	-0.3101	0.2176	0.1971	0.1164	0.2970	-0.0762	-0.0692	0.1969	-0.1130
APPLE-23	-0.0274	-0.0073	-0.0006	-0.0092	-0.0110	-0.1117	0.5821	0.3711	0.1712	0.3252
APPLE-24	-0.0677	-0.0330	-0.2646	-0.0104	-0.0876	-0.0490	0.2590	-0.2206	0.0140	0.1378
APPLE-25	-0.0973	-0.1150	-0.0534	-0.0376	0.0399	0.3250	-0.1166	0.1797	0.0499	0.0222
APPLE-26	0.4218	-0.1053	0.3826	0.5733	-0.0712	0.2400	-0.0465	0.1322	0.1627	-0.1765
APPLE-27	-0.0393	-0.0809	0.1843	-0.0444	-0.0732	-0.1001	-0.0778	-0.1090	0.1157	-0.1478
APPLE-28	-0.0910	-0.1600	-0.0584	0.0225	-0.0602	-0.1133	0.0809	-0.1811	-0.0482	-0.1843
APPLE-29	0.2312	-0.1156	0.0020	-0.1194	0.0495	0.0436	-0.1166	-0.0231	-0.0940	0.1747
APPLE-30	-0.1547	0.1019	0.0138	-0.0923	-0.1284	-0.0134	-0.3944	-0.0437	-0.1496	0.0963

Grade 2 Math (continued)

	APPLE-32	APPLE-33	APPLE-34	APPLE-35	APPLE-36	APPLE-37	APPLE-38	APPLE-39	APPLE-40	APPLE-41
APPLE-31	-0.0503	-0.0891	-0.0826	0.0345	-0.0660	-0.0903	-0.1141	-0.1416	-0.0645	-0.1518
APPLE-32	1.0000	-0.0107	0.2410	0.3238	-0.0096	0.0399	0.0013	-0.1461	0.0519	-0.2262
APPLE-33	-0.0107	1.0000	0.0138	-0.0375	0.1204	-0.1790	-0.2015	0.1925	-0.2065	0.2426
APPLE-34	0.2410	0.0138	1.0000	0.3343	0.2687	0.1153	-0.0644	0.1753	0.2095	-0.2938
APPLE-35	0.3238	-0.0375	0.3343	1.0000	-0.0339	-0.0205	-0.0329	-0.1152	0.3840	-0.0340
APPLE-36	-0.0096	0.1204	0.2687	-0.0339	1.0000	0.1897	0.0183	0.0249	-0.0113	-0.0900
APPLE-37	0.0399	-0.1790	0.1153	-0.0205	0.1897	1.0000	-0.1604	0.2628	0.0634	-0.0161
APPLE-38	0.0013	-0.2015	-0.0644	-0.0329	0.0183	-0.1604	1.0000	0.1005	0.1688	0.2336
APPLE-39	-0.1461	0.1925	0.1753	-0.1152	0.0249	0.2628	0.1005	1.0000	-0.2690	0.3797
APPLE-40	0.0519	-0.2065	0.2095	0.3840	-0.0113	0.0634	0.1688	-0.2690	1.0000	-0.1916
APPLE-41	-0.2262	0.2426	-0.2938	-0.0340	-0.0900	-0.0161	0.2336	0.3797	-0.1916	1.0000
APPLE-42	0.1664	-0.1865	-0.0596	-0.0702	-0.0794	0.1424	0.2412	0.0538	0.1238	-0.1333
APPLE-43	0.2718	-0.0917	-0.0094	0.0177	0.1275	0.4939	-0.1071	-0.1072	0.1224	-0.0718
APPLE-44	0.0877	-0.0866	0.0590	0.0067	0.0197	0.4064	-0.0314	-0.0490	0.2915	-0.1069
APPLE-45	0.0788	0.0839	0.2236	0.0259	0.0407	-0.1183	-0.0958	-0.2111	-0.1091	-0.2570
APPLE-46	0.0284	-0.0754	0.0330	0.0919	0.1374	0.3182	0.1360	0.4179	0.0985	0.2488
APPLE-47	-0.0152	-0.1605	-0.2294	-0.0984	-0.1362	-0.1047	0.0320	-0.3135	-0.0317	-0.2400
APPLE-48	-0.0894	-0.1378	-0.0533	0.0166	0.1623	-0.0171	-0.2195	-0.0588	-0.0533	0.0926
APPLE-49	0.0260	0.2480	-0.1577	0.0373	-0.0845	-0.2840	0.2819	-0.1392	0.0737	0.1428
APPLE-50	0.1711	-0.0620	0.1181	-0.0036	0.0182	-0.0699	-0.0240	-0.0744	-0.0415	-0.0068
CATCH-GN	-0.1955	-0.3031	0.1365	-0.1878	0.2404	0.0993	-0.1539	-0.0926	-0.2575	-0.0422
CATCH-GN	-0.0481	-0.1532	0.0544	-0.0632	-0.3037	-0.1048	0.2905	0.0212	0.0365	-0.0741
MTHAP-GN	-0.1583	-0.2085	-0.1048	-0.0806	0.1488	0.0324	-0.1532	-0.1821	-0.1784	0.0587
TOTMA-GN	-0.2037	-0.2984	-0.0450	-0.1489	-0.0389	0.0016	0.0197	-0.1053	-0.1929	-0.0038

ERIC

	APPLE-42	APPLE-43	APPLE-44	APPLE-45	APPLE-46	APPLE-47	APPLE-48	APPLE-49	APPLE-50	CATCN-GN
WD-----1	-0.2457	-0.1010	-0.0705	0.2487	-0.3050	0.2238	0.1512	0.1472	0.0510	0.1731
WD-----2	0.0379	0.0221	0.0316	-0.1913	0.1445	0.1347	-0.1763	0.0722	0.2826	0.1391
WD-----3	0.2579	-0.2035	-0.3 94	-0.3795	0.0455	0.0740	-0.2141	-0.0608	-0.1329	-0.0773
WD-----4	-0.1227	0.0428	0.1432	0.1026	-0.1501	0.1689	-0.0378	-0.1346	0.2254	0.0295
WD-----5	-0.0159	0.0140	-0.2431	-0.0758	0.0830	0.0801	-0.1007	0.1771	0.1490	0.3258
WD-----6	-0.2464	-0.0533	-0.1476	-0.0282	-0.0288	-0.2540	-0.0960	-0.0699	-0.2691	-0.2662
WD-----7	-0.2634	-0.1473	-0.1581	-0.0934	-0.1048	-0.0866	-0.1180	0.1424	-0.1658	-0.2423
WD-----8	-0.0095	-0.0193	-0.2532	0.0124	0.0214	-0.0076	0.2811	-0.2971	0.0491	0.2661
WD-----9	0.1361	-0.2258	-0.1517	-0.0370	-0.0562	0.0704	0.1043	-0.0095	-0.0237	-0.0296
WD----10	0.0510	-0.2052	-0.1919	-0.2091	0.0097	0.2396	0.0062	0.1617	-0.0566	0.1064
WD----11	0.3803	-0.3386	0.0769	-0.3203	0.2455	-0.0918	-0.0330	-0.0555	-0.0388	0.1943
WD----12	0.2719	-0.1671	-0.1355	-0.3037	0.1929	0.0168	-0.0321	-0.0372	-0.1654	0.0130
WD----13	0.3362	-0.2100	0.0149	-0.1340	0.3951	-0.1396	0.0644	-0.1360	-0.0469	0.1436
WD----14	-0.0840	-0.0813	-0.1642	0.0448	0.0733	-0.0494	-0.0513	0.0622	-0.1122	-0.1078
WD----15	-0.2045	0.2302	-0.1035	0.2860	-0.2120	0.3009	-0.0150	0.2023	-0.2776	0.0647
WD----16	-0.0372	-0.0317	-0.1761	0.0431	0.0589	-0.0008	-0.0676	0.1514	-0.2522	-0.0291
WD----17	0.2927	-0.0294	-0.1961	0.1768	-0.0320	-0.0212	-0.1645	-0.2116	0.1499	0.1783
WD----18	0.1402	-0.0840	-0.0435	0.0715	-0.1474	0.0835	-0.1097	-0.0391	0.0931	0.1714
WD----19	0.2220	0.0413	0.2224	0.0482	0.0925	-0.0437	0.1381	-0.1644	0.2444	0.0801
WD----20	-0.0693	-0.0828	-0.0003	0.1195	-0.1788	0.1790	-0.1543	0.2151	0.1826	0.0428
WD----21	0.0920	-0.1418	-0.0792	0.0293	0.0264	-0.2298	-0.1517	0.1665	0.4433	-0.1218
WD----22	-0.1505	-0.0801	-0.1272	-0.1382	-0.2088	-0.0276	-0.0260	0.0060	0.0012	0.0711
WD----23	-0.1189	-0.2014	-0.1272	0.2344	-0.2455	-0.1503	0.2058	-0.1443	0.3419	0.2874
WD----24	0.0313	-0.1271	-0.0706	-0.0496	-0.0537	-0.0670	-0.0838	-0.0059	-0.2580	-0.0313
WD----25	-0.1871	-0.0516	-0.0118	0.0487	-0.2443	0.1360	-0.0979	0.3500	-0.1148	-0.2973
WD----26	-0.1374	0.2723	-0.0582	0.1863	-0.2075	0.3480	-0.0819	0.2700	-0.1776	-0.0101
WD----27	0.0771	0.0410	0.0827	0.0938	-0.1663	0.1601	-0.0625	0.1156	-0.1787	-0.0877
WD----28	0.2020	0.0797	0.1881	-0.0103	0.1354	0.0924	0.1555	-0.1859	0.1734	0.1597
WD----29	-0.1990	-0.2369	-0.1763	-0.3185	-0.1921	-0.1462	-0.0827	-0.1383	-0.0151	-0.0385
WD----30	0.1105	0.0444	-0.0433	-0.1303	0.0461	0.1122	0.0146	-0.1679	0.2936	0.1525

Grade 2 Math (continued)

	APPLE-42	APPLE-43	APPLE-44	APPLE-45	APPLE-46	APPLE-47	APPLE-48	APPLE-49	APPLE-50	CATCH-ON
RAMOS--1	-0.1193	0.1631	0.1006	0.0763	0.2012	-0.0762	-0.1810	-0.0577	0.1079	0.0353
RAMOS--2	0.1640	0.2310	-0.1153	0.0726	0.3466	-0.1111	-0.1855	-0.1300	-0.0653	0.0744
RAMOS--3	-0.2907	0.0150	0.2902	0.0177	-0.0128	0.0107	-0.0211	0.0360	0.0863	-0.1505
RAMOS--4	-0.1274	-0.0600	-0.0735	0.0243	-0.1481	0.0120	-0.0636	0.0574	0.2492	0.2685
RAMOS--5	0.0915	-0.1016	0.0848	0.0063	-0.1404	-0.0546	-0.0696	-0.0776	0.3089	0.0023
RAMOS--6	0.1712	0.0360	0.1862	0.0649	-0.0302	-0.1456	-0.0395	-0.0318	0.0900	-0.0600
RAMOS--7	-0.2084	-0.0458	-0.2363	0.3053	0.0318	0.0140	-0.1932	0.0290	-0.0025	-0.0494
RAMOS--8	0.0497	0.2860	0.5366	-0.0968	0.4219	-0.2133	-0.0242	-0.2545	0.1512	0.1222
RAMOS--9	-0.2633	0.0982	0.1183	0.2220	0.0627	-0.0575	-0.1421	-0.0805	-0.0217	-0.1097
RAMOS-10	0.3426	0.1602	0.2367	-0.0871	0.0972	-0.0115	-0.1438	-0.2497	0.4306	0.2180
RAMOS-11	0.1683	0.1753	0.1652	0.0435	0.0237	0.0262	-0.1357	-0.0860	0.0515	-0.2158
RAMOS-12	-0.0344	-0.0675	-0.0721	-0.1377	0.1788	-0.0618	-0.1106	0.0806	0.0612	0.1967
RAMOS-13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RAMOS-14	-0.1481	-0.0008	-0.1134	0.1136	0.1602	-0.0594	-0.1307	0.1817	0.0979	0.0740
RAMOS-15	-0.1240	-0.0156	0.2708	0.0954	0.0276	-0.0678	-0.0778	-0.1435	-0.0042	-0.1172
RAMOS-16	0.0097	0.2148	-0.0536	-0.1213	-0.0702	0.3525	-0.0086	0.0097	0.1572	0.0711
RAMOS-17	0.0953	0.2636	-0.0369	0.1047	0.0834	-0.0237	-0.0586	-0.1552	0.1070	-0.0180
RAMOS-18	-0.1310	0.4618	-0.0626	0.1468	-0.1494	-0.0060	-0.0567	-0.0747	-0.1603	-0.0617
RAMOS-19	0.1608	-0.1091	-0.0051	0.0171	0.1090	-0.0865	-0.1099	-0.0507	0.1927	0.1500
RAMOS-20	-0.1094	-0.0945	-0.0602	0.2031	-0.1750	-0.0376	0.0318	-0.1289	0.0326	0.2466

	APPLE-42	APPLE-43	APPLE-44	APPLE-45	APPLE-46	APPLE-47	APPLE-48	APPLE-49	APPLE-50	CATCN-GN
APPLE--1	-0.0379	C.0305	-0.0709	-0.0342	0.3212	-0.0987	-0.0773	0.0342	-0.1525	0.0310
APPLE--2	-0.0408	-C.1058	-0.0579	0.2334	-0.0696	0.2559	-0.0792	0.0811	-0.0814	0.1410
APPLE--3	0.2002	0.2007	-0.0004	0.0978	-0.0337	-0.0228	-0.0816	-0.2419	0.0080	0.1221
APPLE--4	-0.0212	C.1449	-0.0260	0.4486	-0.1685	0.1442	-0.1151	-0.2912	-0.2126	0.0986
APPLE--5	0.0129	-C.1165	C.0351	-0.1168	-0.1103	-0.0143	0.8480	-0.0275	-0.0489	0.1870
APPLE--6	0.3280	C.2046	0.0846	-0.0768	0.2517	-0.1088	-0.0767	-0.1879	0.1715	0.0527
APPLE--7	-0.1950	-C.04C0	0.0332	0.2323	-0.1493	-0.2021	0.1110	-0.0929	-0.1245	-0.0926
APPLE--8	0.0519	-0.0299	0.0860	0.0571	0.0869	-0.2086	-0.0575	-0.1142	0.0689	-0.1464
APPLE--9	-0.1561	C.1408	-0.0075	0.2120	-0.2390	0.0270	-0.1640	0.0444	0.3660	0.4163
APPLE-10	0.1509	0.1340	-0.0072	-0.0594	-0.1255	-0.1074	-0.1295	0.1725	-0.1930	-0.3754
APPLE-11	C.5742	0.0068	0.1415	-0.0898	0.1646	-0.1357	-0.1279	-0.0700	-0.0679	-0.3153
APPLE-12	0.2143	0.0012	0.0154	0.0835	-0.0428	0.2090	-0.1073	-0.1991	0.0003	0.1254
APPLE-13	-0.1988	-0.1094	-0.1113	0.0682	-0.1470	0.7089	-0.0934	0.6757	-0.1736	-0.0151
APPLE-14	-0.0397	-0.0758	-0.0874	0.1948	-0.1474	-0.1035	-0.0972	0.0962	-0.2156	-0.1378
APPLE-15	0.1253	0.1212	0.1490	-0.1093	0.5757	-0.0022	-0.0976	-0.1225	0.0250	-0.1430
APPLE-16	0.1665	C.1872	0.1388	-0.1111	0.3649	-0.1745	-0.1030	-0.1981	0.2451	0.1074
APPLE-17	-0.1231	C.0355	0.1942	-0.2826	0.3125	-0.1384	-0.0537	0.2514	0.1383	0.0236
APPLE-19	-0.1598	0.1224	-0.0433	0.1806	-0.2333	0.0815	-0.1179	-0.0535	0.0930	-0.0094
APPLE-20	0.1014	-C.0291	-0.1312	0.1814	-0.0815	-0.0228	-0.1937	-0.0001	-0.0075	-0.0805
APPLE-21	0.1529	C.1485	-0.0958	0.1752	-0.1900	-0.0856	-0.1018	-0.1369	-0.1799	0.0173
APPLE-22	C.1708	0.1901	0.3998	-0.0350	0.2553	0.1071	0.0460	-0.1218	0.2011	-0.0113
APPLE-23	0.0609	-0.1495	-0.1327	-0.2342	0.3086	-0.1828	-0.0935	0.2019	-0.0856	-0.0558
APPLE-24	-0.1064	-0.1577	-0.0183	0.1608	-0.1182	0.1083	-0.1088	0.1473	0.0217	-0.0393
APPLE-25	-C.1531	-C.0348	-0.0373	C.1384	-0.0150	-0.0074	0.0135	-0.1437	-0.1685	0.0395
APPLE-26	C.0059	C.0561	0.0143	-0.0307	0.3831	0.1314	-0.0798	0.1140	-0.0344	-0.2639
APPLE-27	0.0241	-0.0069	-0.0650	0.1052	-0.1465	0.2335	-0.0478	-0.0954	0.1351	0.3643
APPLE-28	0.2801	-C.1399	0.0803	0.0778	-0.0087	0.1036	-0.0989	-0.0644	0.1268	0.3178
APPLE-29	C.0584	0.1136	0.2205	-0.1413	0.0679	-0.0819	0.6223	-0.0967	0.0641	0.1811
APPLE-30	-0.2186	0.1751	-0.0345	0.2249	-0.1818	-0.1047	0.0388	-0.1477	-0.0065	0.1070

Grade 2 Math (continued)

	APPLE-42	APPLE-43	APPLE-44	APPLE-45	APPLE-46	APPLE-47	APPLE-48	APPLE-49	APPLE-50	CATCH-GN
APPLE-31	-0.1221	-0.0775	-0.0586	0.1013	-0.1306	0.4359	-0.0439	0.4349	-0.1408	-0.0100
APPLE-32	0.1664	0.2718	0.0877	0.0788	0.0284	-0.0152	-0.0894	0.0260	0.1711	-0.1955
APPLE-33	-0.1865	-0.0917	-0.0866	0.0839	-0.0754	-0.1605	-0.1378	0.2480	-0.0620	-0.3031
APPLE-34	-0.0596	-0.0094	0.0590	0.2236	0.0330	-0.2294	-0.0533	-0.1577	0.1181	0.1365
APPLE-35	-0.0702	0.0177	0.0067	0.0259	0.0919	-0.0984	0.0166	0.0373	-0.0036	-0.1878
APPLE-36	-0.0794	0.1275	0.0197	0.0407	0.1374	-0.1362	0.1623	-0.0845	0.0187	0.2404
APPLE-37	0.1424	0.4939	0.4064	-0.1183	0.3182	-0.1047	-0.0171	-0.2840	-0.0699	0.0993
APPLE-38	0.2412	-0.1071	-0.0314	-0.0958	0.1360	0.0320	-0.2195	0.2819	-0.0240	-0.1539
APPLE-39	0.0538	-0.1072	-0.0490	-0.2111	0.4179	-0.3135	-0.0588	-0.1392	-0.0744	-0.0926
APPLE-40	0.1238	0.1224	0.2915	-0.1091	0.0985	-0.0317	-0.0533	0.0737	-0.0415	-0.2575
APPLE-41	-0.1333	-0.0718	-0.1069	-0.2570	0.2488	-0.2400	0.0926	0.1428	-0.0068	-0.0422
APPLE-42	1.0000	-0.0812	0.1296	-0.2181	0.2423	-0.2014	-0.1552	-0.1793	0.0339	-0.0349
APPLE-43	-0.0812	1.0000	0.5629	0.0124	0.0264	0.0435	-0.0409	-0.1217	0.1162	0.0038
APPLE-44	0.1296	0.5629	1.0000	-0.1267	0.1164	-0.1048	0.0041	-0.1622	0.2316	-0.0894
APPLE-45	-0.2181	0.0124	-0.1267	1.0000	-0.3778	0.1559	-0.0384	-0.0756	0.0076	0.1038
APPLE-46	0.2423	0.0264	0.1164	-0.3778	1.0000	-0.2585	-0.1316	-0.1332	-0.0414	-0.0802
APPLE-47	-0.2014	0.0435	-0.1048	0.1559	-0.2585	1.0000	-0.1035	0.4228	-0.0915	0.0981
APPLE-48	-0.1552	-0.0409	0.0041	-0.0384	-0.1316	-0.1035	1.0000	-0.1482	-0.1554	0.1589
APPLE-49	-0.1793	-0.1217	-0.1622	-0.0756	-0.1332	0.4228	-0.1482	1.0000	-0.1182	-0.2334
APPLE-50	0.0339	0.1162	0.2316	0.0076	-0.0414	-0.0915	-0.1554	-0.1182	1.0000	0.3560
CATCH-GN	-0.0349	0.0038	-0.0894	0.1038	-0.0802	0.0981	0.1589	-0.2334	0.3560	1.0000
CATCH-GN	-0.1342	-0.2144	0.0837	-0.0851	-0.1713	-0.0767	0.0837	0.0049	-0.1759	-0.1792
MTHAP-GN	-0.1664	0.0263	-0.3009	-0.0364	-0.2883	0.0041	0.2169	-0.1347	0.0088	0.4201
TOTMA-GN	-0.1605	-0.1021	-0.1159	-0.0586	-0.2909	-0.0251	0.2254	-0.1454	-0.0100	0.4387

ERIC

	CATCH-GN	MTHAP-GN	TOTMA-GN
WC-----1	-0.0932	0.1149	0.0353
WC-----2	-0.1338	0.0680	-0.0145
WC-----3	-0.0725	0.2116	0.0447
WC-----4	-0.0300	0.0799	0.0114
WC-----5	-0.1805	0.1292	0.0400
WC-----6	0.0144	-0.1317	-0.1532
WC-----7	-0.0784	-0.1171	-0.1842
WC-----8	0.0205	0.2533	0.2366
WC-----9	0.4358	0.1725	0.3717
WC----10	0.0389	0.0849	0.1270
WC----11	0.0803	0.0012	0.1006
WC----12	-0.1723	-0.1856	-0.2207
WC----13	-0.2165	-0.5013	-0.3789
WC----14	-0.2072	-0.0915	-0.2063
WC----15	-0.0757	0.1267	0.0591
WC----16	-0.2826	-0.0314	-0.1908
WC----17	-0.2437	0.0467	-0.0624
WC----18	-0.1831	0.3420	0.1299
WC----19	-0.1861	-0.0496	-0.1415
WC----20	-0.1915	0.0343	-0.0834
WC----21	-0.1604	-0.3284	-0.3311
WC----22	0.2100	0.3387	0.3898
WC----23	-0.0702	-0.0618	-0.0140
WC----24	-0.0934	-0.0928	-0.0927
WC----25	-0.1819	-0.0478	-0.2386
WC----26	-0.1562	0.0080	-0.0785
WC----27	-0.2806	-0.0324	-0.2122
WC----28	-0.3166	0.0520	-0.1369
WC----29	0.2349	0.1364	0.2188
WC----30	-0.1336	0.0829	0.0241

Grade 2 Math (continued)

	CATCH-GN	MTHAP-GN	TCTMA-GN
RAMOS--1	-0.1547	-0.1860	-0.1677
RAMOS--2	-0.2696	-0.2051	-0.2533
RAMOS--3	0.0912	-0.0905	-0.0221
RAMOS--4	-0.0306	0.1186	0.1418
RAMOS--5	-0.0981	-0.0454	-0.0888
RAMOS--6	0.0897	-0.1279	-0.0701
RAMOS--7	-0.4406	-0.1312	-0.3665
RAMOS--8	-0.0189	-0.2335	-0.0388
RAMOS--9	-0.2435	-0.1283	-0.2647
RAMOS-10	-0.2946	0.0420	-0.1083
RAMOS-11	-0.3017	-0.1430	-0.3153
RAMOS-12	-0.1390	0.0734	0.0272
RAMOS-13	0.0	0.0	0.0
RAMOS-14	-0.1162	-0.2916	-0.2031
RAMOS-15	-0.0546	-0.0226	-0.0831
RAMOS-16	-0.0954	0.0581	-0.0389
RAMOS-17	-0.2162	0.1248	-0.0728
RAMOS-18	-0.2588	0.2106	-0.0457
RAMOS-19	-0.2647	-0.3550	-0.3677
RAMOS-20	0.1653	0.3143	0.3440

Grade 2 Math (continued)

	CATCM-GN	MTHAP-GN	TOTMA-GN
APPLE--1	-0.2494	-0.2107	-0.2307
APPLE--2	0.1498	-0.2699	-0.0323
APPLE--3	-0.2316	0.3355	0.0598
APPLE--4	0.0904	-0.0383	0.0594
APPLE--5	0.0651	0.1305	0.1634
APPLE--6	-0.1282	-0.0040	-0.0884
APPLE--7	-0.1746	-0.0258	-0.1789
APPLE--8	-0.0280	-0.0214	-0.1300
APPLE--9	-0.3181	0.0361	-0.0380
APPLE-10	-0.1992	0.0293	-0.2397
APPLE-11	0.1070	-0.0941	-0.0834
APPLE-12	-0.1490	-0.0467	-0.0603
APPLE-13	0.1237	-0.0134	0.0826
APPLE-14	-0.0014	-0.0722	-0.0832
APPLE-15	-0.1241	-0.2632	-0.2714
APPLE-16	-0.2518	0.0107	-0.1336
APPLE-17	0.2469	0.1012	0.2298
APPLE-19	-0.2112	-0.1442	-0.2035
APPLE-20	-0.0873	-0.1533	-0.2018
APPLE-21	0.1114	0.3969	0.3617
APPLE-22	-0.1828	-0.2407	-0.2744
APPLE-23	0.2141	-0.0964	0.0514
APPLE-24	0.0505	-0.1056	-0.0567
APPLE-25	0.0247	-0.0342	0.0059
APPLE-26	-0.1027	-0.3938	-0.3904
APPLE-27	-0.1659	-0.2427	-0.1520
APPLE-28	-0.0128	-0.1520	0.0083
APPLE-29	-0.0178	-0.0356	0.0341
APPLE-30	-0.2116	0.2408	0.0370

Grade 2 Math (continued)

	CATCM-GN	MTHAP-GN	TOTMA-GN
APPLE-31	-0.0478	0.0579	0.0068
APPLE-32	-0.0481	-0.1583	-0.2037
APPLE-33	-0.1532	-0.2085	-0.2984
APPLE-34	0.0544	-0.1048	-0.0450
APPLE-35	-0.0637	-0.0806	-0.1489
APPLE-36	-0.3037	0.1488	-0.0389
APPLE-37	-0.1048	0.0324	0.0016
APPLE-38	0.2905	-0.1532	0.0197
APPLE-39	0.0212	-0.1821	-0.1053
APPLE-40	0.0365	-0.1784	-0.1929
APPLE-41	-0.0741	0.0587	-0.0038
APPLE-42	-0.1342	-0.1664	-0.1605
APPLE-43	-0.2144	0.0263	-0.1021
APPLE-44	0.0837	-0.3009	-0.1159
APPLE-45	-0.0851	-0.0364	-0.0586
APPLE-46	-0.1713	-0.2883	-0.2909
APPLE-47	-0.0767	0.0041	-0.0251
APPLE-48	0.0837	0.2169	0.2254
APPLE-49	0.0049	-0.1347	-0.1454
APPLE-50	-0.1759	0.0088	-0.0100
CATCN-GN	-0.1792	0.4201	0.4387
CATCM-GN	1.0000	0.1151	0.6446
MTHAP-GN	0.1151	1.0000	0.7720
TOTMA-GN	0.6446	0.7720	1.0000

Correlations Among the Basic Components of the Teaching Performance Variables and the Pupil Achievement Tests
Grade 5 Math

BTES GRADE 5 MATH

	WD-----1	WD-----2	WD-----3	WD-----4	WD-----5	WD-----6	WD-----7	WD-----8	WD-----9	WD----10
WD-----1	1.0000	0.4229	0.0740	0.1930	0.0025	-0.0255	0.1495	0.2663	-0.0114	0.1340
WD-----2	0.4229	1.0000	0.3326	0.5454	0.4274	-0.1337	-0.1049	0.3006	0.1375	0.2402
WD-----3	0.0740	0.3326	1.0000	0.1236	0.1357	-0.1304	-0.1582	0.3885	0.2403	0.3207
WD-----4	0.1930	0.5454	0.1236	1.0000	0.2673	0.1331	0.1697	0.2233	0.1782	0.1381
WD-----5	0.0025	0.4274	0.1357	0.2673	1.0000	-0.2314	-0.1178	0.2586	-0.0932	0.3133
WD-----6	-0.0255	-0.1337	-0.1304	0.1331	-0.2314	1.0000	0.6868	0.0363	0.2373	-0.0611
WD-----7	0.1495	-0.1049	-0.1582	0.1697	-0.1178	0.6868	1.0000	0.0971	0.2794	0.1780
WD-----8	0.2663	0.3006	0.3885	0.2233	0.2586	0.0363	0.0971	1.0000	0.6747	0.5033
WD-----9	-0.0114	0.1375	0.2403	0.1782	-0.0932	0.2373	0.2794	0.6747	1.0000	0.4023
WD----10	0.1340	0.2402	0.3207	0.1381	0.3133	-0.0611	0.1780	0.5033	0.4023	1.0000
WD----11	-0.3835	-0.1922	-0.0410	-0.1426	0.1101	-0.1904	-0.0842	-0.1672	0.0704	0.0182
WD----12	-0.4058	-0.4866	-0.2488	-0.1912	-0.0733	-0.0400	0.0453	-0.0562	0.0140	-0.0620
WD----13	-0.2388	-0.3439	-0.1714	-0.3047	-0.0680	-0.0242	0.0049	-0.1723	0.0000	-0.1469
WD----14	0.2913	0.0202	-0.0716	0.2169	0.0003	0.5148	0.8203	0.2992	0.3559	0.3548
WD----15	0.1503	-0.1846	-0.1839	0.0781	-0.1284	0.5534	0.9221	0.0955	0.2754	0.1353
WD----16	0.1585	-0.0505	-0.1441	0.1972	-0.0973	0.4168	0.8117	0.0281	0.2073	0.2702
WD----17	0.1406	0.3022	0.2629	0.2397	0.2646	-0.0917	-0.0446	0.4824	0.4528	0.3670
WD----18	0.0261	0.1226	0.2461	0.2210	0.2615	0.0026	0.0859	0.3261	0.2830	0.2197
WD----19	-0.0181	-0.0050	0.1052	-0.0751	-0.2918	-0.1897	-0.0516	0.0652	0.2588	0.2712
WD----20	0.2035	0.0291	-0.2188	0.0907	0.1681	-0.1286	-0.0636	0.0680	-0.0802	0.0825
WD----21	0.0210	0.1405	-0.0556	0.1714	0.1239	0.0336	0.0815	0.1002	-0.0397	-0.2221
WD----22	0.3658	0.1496	0.1162	0.1960	0.0632	-0.0808	-0.0789	0.0815	-0.1649	-0.0043
WD----23	0.0137	-0.1825	-0.1410	-0.2512	-0.3392	0.1460	0.1165	-0.2097	0.0141	-0.1794
WD----24	0.1982	-0.0219	-0.0417	0.2089	-0.0575	0.5879	0.8327	0.1990	0.3580	0.3304
WD----25	0.1884	-0.1129	-0.1146	0.1536	-0.1578	0.6215	0.8452	0.0880	0.2848	0.1900
WD----26	-0.1621	-0.1352	-0.1728	0.1382	-0.1746	0.5231	0.7115	-0.1552	0.1147	0.0741
WD----27	0.1886	-0.0403	-0.0817	0.1735	-0.0115	0.4064	0.8890	0.1782	0.3049	0.3060
WD----28	0.1781	0.1350	0.0306	0.0859	0.1875	-0.2938	-0.3653	-0.0665	-0.1679	-0.2024
WD----29	-0.0780	0.1385	0.0027	0.0559	0.0126	0.0141	0.0339	0.1461	0.0992	-0.0099
WD----30	0.2290	-0.0786	0.1806	-0.0068	-0.1777	0.2384	0.1779	0.0683	0.0312	-0.0684

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Grade 5 Math (continued)

	WD-----1	WD-----2	WD-----3	WD-----4	WD-----5	WD-----6	WD-----7	WD-----8	WD-----9	WD----10
RAMCS--1	-0.0088	0.1519	0.1516	0.0197	0.0298	-0.0536	-0.1929	-0.0040	0.0363	-0.0246
RAMCS--2	-0.0946	0.1931	-0.0394	0.2287	0.1376	0.0072	-0.0741	0.0098	0.0493	0.0107
RAMCS--3	0.0715	0.0248	0.2117	-0.1665	-0.0726	-0.0635	-0.1582	-0.0269	-0.0133	-0.0435
RAMCS--4	-0.0474	-0.1934	-0.1276	-0.0530	-0.1351	-0.0784	-0.1127	0.0532	0.0082	-0.1343
RAMCS--5	-0.0051	0.1221	0.0132	0.1979	0.1466	0.0998	0.2206	0.1975	0.2871	0.3933
RAMCS--6	-0.2049	-0.2454	-0.0463	-0.1717	-0.0546	-0.0371	0.0759	0.0153	0.1213	0.0467
RAMCS--7	0.2044	0.1701	-0.0296	0.0288	0.1536	0.1281	0.0052	0.0868	0.0663	0.0139
RAMCS--8	-0.1956	-0.0262	0.1998	-0.2198	-0.1199	-0.1531	-0.1441	0.0455	0.0571	-0.0789
RAMCS--9	0.1068	0.1796	0.1268	-0.0504	0.0426	-0.0049	-0.1356	0.0184	0.0597	-0.0645
RAMCS-10	-0.2411	-0.1015	0.1585	-0.0174	0.0334	-0.1345	-0.0491	0.1256	0.1713	0.0821
RAMCS-11	0.2126	0.2406	0.1720	-0.1024	0.0866	-0.2522	-0.1834	-0.0265	0.0170	0.0292
RAMCS-12	0.0352	0.0328	-0.1781	0.0219	0.0027	-0.1389	-0.1354	-0.1145	-0.1662	0.0256
RAMCS-13	-0.1460	-0.0429	-0.1522	-0.0777	-0.1301	-0.1020	-0.1467	0.0437	0.1245	-0.0269
RAMCS-14	0.0922	0.0661	0.0360	-0.1154	-0.1419	-0.0854	-0.0457	-0.0411	-0.0375	0.0811
RAMCS-15	0.0718	0.1158	0.0753	-0.0243	0.1137	0.0742	-0.0446	0.0107	0.0416	-0.0294
RAMCS-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RAMCS-17	-0.1329	0.0511	0.1775	0.1531	0.0014	-0.1345	-0.1225	0.1838	0.2647	0.1220
RAMCS-18	-0.0595	-0.1923	0.0	0.0	0.0	-0.0360	-0.0518	0.1938	0.1260	0.0373
RAMCS-19	0.0090	-0.0489	0.3930	-0.2505	-0.2058	-0.0641	-0.0474	0.1293	0.1018	-0.0078
RAMCS-20	-0.0582	0.1383	0.0724	0.0396	0.3346	-0.0737	-0.0781	0.0568	0.0117	-0.0750

	WD-----1	WD-----2	WD-----3	WD-----4	WD-----5	WD-----6	WD-----7	WD-----8	WD-----9	WD----10
APPLE--1	-0.1645	0.0507	-0.1583	-0.2897	-0.1558	-0.0997	-0.0597	-0.0369	-0.0473	-0.0248
APPLE--2	-0.1228	0.0383	0.0240	-0.0704	0.1896	-0.1718	-0.1276	-0.0565	0.0633	0.0498
APPLE--3	-0.1326	-0.0701	0.2278	-0.1502	-0.0670	0.0540	0.0502	-0.0148	0.0040	-0.0267
APPLE--4	0.2543	0.1208	0.1494	0.0152	0.1691	-0.0893	-0.1473	0.0937	0.0613	-0.0362
APPLE--5	-0.0056	0.2090	0.0550	0.1842	0.1705	-0.1040	0.0151	0.1741	0.1187	0.2040
APPLE--6	0.0006	-0.0620	-0.1655	-0.0259	-0.1165	0.0897	0.1641	-0.1163	-0.0368	-0.0152
APPLE--7	0.0820	-0.0949	-0.0779	-0.0958	0.0687	-0.1651	-0.1255	-0.0076	-0.1386	0.1126
APPLE--8	-0.1070	-0.1366	-0.0963	-0.2609	0.0113	0.1321	-0.0217	-0.1641	-0.0223	-0.2275
APPLE--9	0.2628	-0.0872	-0.0887	-0.0683	-0.0484	-0.0554	-0.1014	0.0644	-0.1765	0.1130
APPLE-10	0.0003	0.0408	-0.0449	-0.0295	0.1378	-0.0348	-0.0770	-0.1094	0.0812	0.0839
APPLE-11	-0.0608	-0.0309	-0.0569	0.1592	0.1064	-0.1541	-0.1203	-0.0316	-0.2229	0.0328
APPLE-12	-0.0358	-0.0971	-0.1333	-0.1421	-0.0904	-0.0000	0.0270	-0.0143	0.1515	-0.1303
APPLE-13	-0.0251	0.0844	-0.0418	0.0451	0.1214	-0.0851	-0.0673	-0.1279	-0.0374	-0.0285
APPLE-14	-0.0062	-0.0714	-0.2021	0.0454	0.0193	-0.1767	-0.1768	-0.1688	-0.2356	-0.1560
APPLE-15	-0.0302	-0.0942	0.2084	-0.0155	-0.0934	0.0481	0.1397	0.1939	0.1945	0.2902
APPLE-16	0.1586	0.2637	0.1693	0.0834	0.1786	-0.0193	0.0376	0.3812	0.3408	0.4958
APPLE-17	-0.0529	-0.1100	-0.0275	0.0524	0.0622	-0.0291	0.1242	0.0757	0.0680	0.1021
APPLE-19	-0.0610	0.0071	-0.0993	-0.1169	-0.0406	-0.0038	-0.1086	0.0249	0.1951	0.0081
APPLE-20	0.3702	0.1857	0.1244	0.2018	0.1299	-0.0312	-0.0340	0.0419	-0.0834	-0.0322
APPLE-21	0.1022	0.0065	-0.1625	-0.1347	-0.0009	-0.0626	-0.0502	-0.1704	-0.3823	-0.1747
APPLE-22	-0.1431	-0.1974	-0.0182	-0.1552	-0.0533	-0.1743	-0.1539	0.0895	-0.0995	0.1525
APPLE-23	-0.1645	0.1834	0.0814	0.1147	0.3312	-0.0483	-0.0874	-0.1032	0.0103	-0.0185
APPLE-24	0.1439	0.0817	-0.2324	-0.2106	-0.0100	-0.0362	0.0813	-0.1527	-0.0858	-0.0677
APPLE-25	0.0220	0.0849	-0.0357	-0.1015	-0.0143	-0.0953	-0.1286	-0.2117	-0.1679	-0.1503
APPLE-26	0.1238	-0.0264	0.0549	-0.1314	0.0510	-0.0529	-0.0866	0.2305	0.0030	0.2565
APPLE-27	-0.0930	-0.2506	-0.2662	-0.0550	-0.0752	0.2153	0.2543	-0.0611	0.0025	-0.1249
APPLE-28	-0.1545	-0.1694	0.1749	-0.0392	-0.0389	-0.1519	-0.1387	-0.0149	-0.0485	-0.0055
APPLE-29	0.0710	-0.0575	-0.1250	-0.1511	-0.0175	0.0603	-0.0023	-0.0422	0.0351	0.0184
APPLE-30	0.0950	-0.0551	-0.0178	0.1068	0.0697	-0.1835	-0.1542	0.0196	-0.0454	0.0221

Grade 5 Math (continued)

	WD-----1	WD-----2	WD-----3	WD-----4	WD-----5	WD-----6	WD-----7	WD-----8	WD-----9	WD----10
APPLE-31	0.0863	0.0804	-0.1471	0.1067	0.2936	-0.1037	-0.1400	0.0060	-0.0886	-0.0127
APPLE-32	-0.2079	0.0634	0.1371	-0.0628	0.3124	-0.1087	-0.1083	-0.0051	0.1493	0.0662
APPLE-33	-0.1216	-0.1749	-0.0258	-0.0886	-0.2338	-0.0052	-0.0937	-0.1041	0.0520	-0.0825
APPLE-34	-0.0889	-0.0085	-0.0476	0.1154	0.0139	-0.0489	-0.0702	0.0787	-0.0043	0.2921
APPLE-35	-0.0438	0.0242	0.2663	-0.0614	-0.0669	-0.0566	-0.0764	0.0373	-0.0491	0.1768
APPLE-36	0.0859	-0.0288	0.2979	-0.0981	-0.2199	-0.0965	-0.1302	0.0677	-0.0390	-0.1661
APPLE-37	0.1416	0.0741	0.0300	0.0221	0.1668	-0.0787	0.0833	0.2585	-0.0107	0.0882
APPLE-38	0.1575	0.2313	0.2668	0.1413	0.0582	-0.0978	-0.0026	0.1356	0.1290	0.1220
APPLE-39	-0.1445	0.0863	0.0144	0.1780	-0.0872	-0.0510	-0.0963	-0.1117	-0.0173	-0.1304
APPLE-40	0.0413	-0.0022	0.0707	0.1678	0.2257	-0.1558	-0.2103	-0.0942	-0.1753	0.0041
APPLE-41	0.0353	-0.2403	-0.2121	-0.1840	-0.1707	-0.0729	-0.1111	-0.0824	0.0465	-0.2410
APPLE-42	0.0335	-0.0282	0.1250	0.0476	0.2721	0.0495	0.0513	0.2047	0.1982	0.1834
APPLE-43	-0.0530	0.0799	0.1262	-0.0079	0.1469	-0.1110	-0.0642	0.2423	0.2074	0.2657
APPLE-44	0.0735	0.1469	0.1353	0.0281	0.0016	-0.1125	-0.0200	0.0526	0.1701	-0.0081
APPLE-45	0.1233	-0.0956	-0.0871	-0.2066	0.1727	-0.2257	-0.1662	-0.0102	-0.0587	0.0922
APPLE-46	-0.1138	-0.0417	0.0441	-0.1534	-0.0487	-0.1202	-0.0957	0.1311	-0.0039	0.0755
APPLE-47	-0.1299	-0.0579	0.0110	-0.0673	0.0041	-0.0594	-0.0760	0.1792	0.1351	0.2001
APPLE-48	0.0891	-0.2807	-0.2985	-0.2061	-0.0650	0.0700	0.1748	-0.0849	-0.0301	0.0258
APPLE-49	-0.1335	0.0887	0.0968	-0.0711	0.1839	-0.1052	-0.1268	-0.0739	0.1066	0.0934
APPLE-50	0.0451	0.1569	0.1359	0.3551	0.1011	-0.1734	-0.1354	0.1028	0.0116	0.1735
CATCH-GN	-0.2044	-0.1232	-0.2092	-0.1282	-0.0580	0.0961	0.0845	-0.1366	-0.1494	-0.3763
CATCH-GN	-0.0762	-0.1911	-0.0438	0.1029	0.0307	-0.1091	0.0168	-0.0331	-0.0474	-0.1869
MTHAP-GN	-0.0169	-0.1620	-0.0234	-0.0118	0.0419	0.1386	0.1782	0.1459	0.1475	0.1129
TOTMA-GN	-0.0920	-0.2243	-0.0979	-0.0162	0.0139	0.0720	0.1616	0.0445	0.0344	-0.0808

Grade 5 Math (continued)

	WD----11	WD----12	WD----13	WD----14	WD----15	WD----16	WD----17	WD----18	WD----19	WD----20
WD-----1	-0.3835	-0.4058	-0.2388	0.2913	0.1503	0.1585	0.1406	0.0261	-0.0181	0.2035
WD-----2	-0.1922	-0.4866	-0.3439	0.0202	-0.1846	-0.0505	0.3022	0.1226	-0.0050	0.0291
WD-----3	-0.0410	-0.2488	-0.1714	-0.0716	-0.1839	-0.1441	0.2629	0.2461	0.1052	-0.2188
WD-----4	-0.1426	-0.1912	-0.3047	0.2169	0.0781	0.1972	0.2397	0.2210	-0.0751	0.0907
WD-----5	0.1101	-0.0793	-0.0680	0.0003	-0.1284	-0.0973	0.2646	0.2615	-0.2918	0.1681
WD-----6	-0.1904	-0.0400	-0.0242	0.5148	0.5534	0.4168	-0.0917	0.0026	-0.1897	-0.1286
WD-----7	-0.0842	0.0453	0.0049	0.8203	0.9221	0.8117	-0.0446	0.0859	-0.0516	-0.0636
WD-----8	-0.1672	-0.0562	-0.1723	0.2992	0.0955	0.0281	0.4824	0.3261	0.0652	0.0680
WD-----9	0.0704	0.0140	0.0000	0.3559	0.2754	0.2073	0.4528	0.2830	0.2588	-0.0802
WD----10	0.0182	-0.0620	-0.1469	0.3548	0.1353	0.2702	0.3670	0.2197	0.2712	0.0825
WD----11	1.0000	0.6510	0.3169	-0.2267	-0.0121	0.1164	0.0898	-0.0154	0.3598	-0.1426
WD----12	0.6510	1.0000	0.4125	-0.0836	0.1261	0.1537	-0.0004	0.0464	0.3250	-0.0470
WD----13	0.3169	0.4125	1.0000	-0.0094	0.0524	-0.0071	-0.1154	-0.1508	0.1091	0.0674
WD----14	-0.2267	-0.0836	-0.0094	1.0000	0.7710	0.6040	0.0313	0.0882	-0.1040	-0.0686
WD----15	-0.0121	0.1261	0.0524	0.7710	1.0000	0.8203	-0.0261	0.1129	-0.0082	-0.0853
WD----16	0.1164	0.1537	-0.0071	0.6040	0.8203	1.0000	0.0697	0.0672	0.1593	0.0031
WD----17	0.0898	-0.0004	-0.1154	0.0313	-0.0261	0.0697	1.0000	0.5747	0.2180	0.2024
WD----18	-0.0154	0.0464	-0.1508	0.0882	0.1129	0.0672	0.5747	1.0000	0.0244	0.0326
WD----19	0.3598	0.3250	0.1091	-0.1040	-0.0082	0.1593	0.2180	0.0244	1.0000	-0.0994
WD----20	-0.1926	-0.0470	0.0674	-0.0686	-0.0853	0.0031	0.2024	0.0326	-0.0994	1.0000
WD----21	-0.0894	-0.0054	0.0738	0.1299	0.1096	-0.0092	-0.0061	0.0677	-0.3947	-0.1426
WD----22	-0.2496	-0.1896	-0.2798	0.1307	-0.0654	-0.1115	-0.1758	-0.0974	-0.1453	-0.2224
WD----23	-0.1135	-0.0929	-0.2002	-0.0569	0.1210	0.1097	0.0267	0.0629	0.0794	0.0780
WD----24	-0.0121	0.0749	-0.0586	0.7710	0.7987	0.8203	0.0532	0.0756	-0.0082	-0.0853
WD----25	0.0359	0.1290	-0.0168	0.6420	0.8961	0.9120	0.0524	0.1071	0.0546	-0.0545
WD----26	0.1577	0.2309	0.0553	0.4215	0.7299	0.8191	-0.0532	-0.0066	0.0553	-0.1577
WD----27	-0.0327	0.0742	0.0029	0.8602	0.8836	0.7650	-0.0035	0.0956	-0.0352	-0.0969
WD----28	0.1292	0.0654	-0.0103	-0.3203	-0.3434	-0.1226	0.1195	0.0460	0.1151	0.1875
WD----29	-0.0505	-0.0241	-0.0232	0.0133	0.0296	0.0445	0.0571	0.0548	-0.1420	-0.1643
WD----30	-0.1325	0.0676	-0.0105	0.1155	0.1235	0.0440	0.1010	0.1231	-0.1354	0.0245

Grade 5 Math (continued)

	WD----11	WD----12	WD----13	WD----14	WD----15	WD----16	WD----17	WD----18	WD----19	WD----20
RAMOS--1	0.0366	-0.0864	0.1549	-0.1771	-0.2026	-0.1869	-0.0338	-0.0840	0.0854	0.2707
RAMOS--2	0.1491	0.1051	0.0376	-0.1309	-0.0730	-0.0087	0.2744	0.0726	0.1389	0.3334
RAMOS--3	-0.0705	-0.1978	0.1361	-0.1081	-0.1651	-0.2035	-0.2608	-0.1522	-0.0178	0.0164
RAMOS--4	0.0045	0.2356	0.1046	-0.1181	-0.1181	-0.0898	-0.0147	-0.0316	0.0799	0.1703
RAMOS--5	-0.1273	-0.0626	-0.0380	0.4763	0.1342	0.1887	0.1640	0.0790	-0.1060	0.0265
RAMOS--6	0.3915	0.4915	0.4934	-0.0192	0.1438	0.2126	0.0273	-0.0769	0.2358	-0.1499
RAMOS--7	-0.1345	-0.0997	0.1380	0.1051	-0.0283	-0.0855	-0.0832	-0.0798	-0.0917	0.1528
RAMOS--8	0.2036	0.0066	-0.1807	-0.2213	-0.1191	-0.0411	0.1537	0.0196	0.2092	0.0337
RAMOS--9	-0.0848	-0.1435	0.1527	-0.0758	-0.1687	-0.2154	-0.1744	-0.1908	0.0429	0.2716
RAMOS-10	0.3890	0.3353	0.0393	-0.1426	0.0360	0.1389	0.4049	0.2790	0.2133	-0.0144
RAMOS-11	-0.1057	-0.1842	0.0969	-0.1213	-0.1841	-0.1921	-0.1517	-0.1939	0.0909	0.2038
RAMOS-12	0.0420	-0.0335	0.0900	-0.2044	-0.1164	-0.0495	0.1148	0.0510	0.0091	0.2741
RAMOS-13	-0.0370	-0.0790	-0.0281	-0.1538	-0.1538	-0.1169	-0.0964	0.0948	0.0965	0.0208
RAMOS-14	0.0985	0.1124	0.0699	-0.1029	-0.0078	0.0591	0.1138	-0.0937	0.2125	0.0663
RAMOS-15	0.0072	-0.0903	0.1237	0.0100	-0.0753	-0.1196	-0.2065	-0.1398	-0.0267	0.1950
RAMOS-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RAMOS-17	0.1466	0.1345	-0.0067	-0.1649	-0.0848	0.0086	0.3180	-0.0455	0.3409	0.1103
RAMOS-18	0.3197	0.4793	0.4119	-0.0543	-0.0543	-0.0413	0.1078	0.0335	0.1429	-0.0803
RAMOS-19	0.0301	-0.0355	0.1006	-0.0101	-0.0101	-0.0323	0.1143	0.1616	0.0601	-0.1126
RAMOS-20	0.0765	0.0876	-0.0311	-0.1111	-0.0718	-0.0396	0.0409	0.2504	-0.1707	-0.1645

Grade 5 Math (continued)

	WD----11	WD----12	WD----13	WD----14	WD----15	WD----16	WD----17	WD----18	WD----19	WD----20
APPLE--1	0.2580	0.0237	0.0013	-0.1303	-0.0324	0.0245	-0.2251	-0.1327	0.1622	-0.2026
APPLE--2	-0.0233	-0.0844	-0.0642	-0.1250	-0.1028	-0.0336	0.0886	0.0392	0.0896	0.2900
APPLE--3	-0.0045	0.0408	-0.0763	-0.1313	0.0337	-0.0410	0.1457	0.2174	0.1883	0.0369
APPLE--4	0.0359	-0.1367	-0.0655	-0.0112	-0.0475	-0.1371	-0.1201	0.0417	-0.0948	-0.1067
APPLE--5	-0.0307	-0.1026	0.0034	0.0809	0.0633	-0.0150	0.3495	0.2358	0.0920	0.0360
APPLE--6	-0.1788	-0.0507	-0.0995	0.0147	0.1772	0.0773	-0.1948	-0.1072	-0.0171	0.0440
APPLE--7	-0.0393	0.0508	0.2697	-0.1386	-0.1434	-0.0163	0.1325	0.0105	0.2251	0.2902
APPLE--8	-0.0011	-0.0801	0.0497	-0.0865	0.0186	0.0085	-0.4036	-0.3094	-0.1611	-0.1060
APPLE--9	-0.1879	-0.1418	0.0575	-0.0758	-0.0994	-0.0310	-0.2308	-0.2980	0.0264	0.0162
APPLE-10	0.1898	0.0177	0.0297	-0.0255	-0.0433	-0.0144	0.0964	0.1844	-0.0625	0.0579
APPLE-11	-0.1651	0.0247	-0.2180	-0.0618	-0.1464	-0.1113	0.1236	0.0530	-0.0488	0.1449
APPLE-12	0.2335	0.1321	0.0501	-0.0532	0.0298	0.0620	0.0998	0.0290	0.0665	0.0089
APPLE-13	0.1636	0.1525	0.1682	-0.0417	-0.0561	-0.0742	0.0488	0.0816	-0.1089	-0.1262
APPLE-14	0.0511	0.2582	0.1492	-0.1385	-0.1491	-0.1240	0.0211	0.0277	-0.0404	0.0837
APPLE-15	-0.0488	0.0338	0.0293	0.1898	0.1708	-0.0920	0.0710	0.0075	0.0534	0.0112
APPLE-16	-0.1176	-0.1013	-0.1215	0.1996	-0.0468	-0.0639	0.0899	-0.1386	0.0637	0.2276
APPLE-17	-0.0116	0.0125	0.1159	0.2674	0.0611	-0.0668	-0.1807	-0.2302	-0.0294	-0.1369
APPLE-19	0.1604	-0.0737	0.1221	-0.0628	-0.1238	-0.1276	-0.0751	-0.0744	0.1777	-0.2044
APPLE-20	-0.1606	-0.0871	-0.0666	0.0017	0.0204	0.0030	0.0335	0.0807	-0.2345	0.2065
APPLE-21	-0.0912	0.0746	-0.1155	-0.0762	-0.0367	-0.0005	-0.2961	-0.2527	-0.0187	0.0576
APPLE-22	0.1189	0.2384	-0.0707	-0.2263	-0.1291	-0.0965	0.2273	0.0379	0.3736	0.0748
APPLE-23	0.0553	0.0090	0.0097	-0.1593	-0.1120	-0.0870	-0.0357	-0.0625	-0.1168	0.2997
APPLE-24	-0.0252	-0.0826	0.0375	-0.0423	0.1187	0.1936	0.0532	0.0358	-0.1148	0.0980
APPLE-25	0.0475	-0.1527	-0.0496	-0.1245	-0.1330	-0.0947	-0.2623	-0.2342	-0.1231	-0.1196
APPLE-26	-0.0509	-0.0052	-0.1139	-0.1619	-0.1177	-0.0964	0.1063	-0.1609	0.1228	-0.0131
APPLE-27	-0.1618	0.0137	0.2356	0.3556	0.3382	0.0987	-0.2015	-0.1389	0.0316	-0.0421
APPLE-28	0.1605	0.1768	-0.0187	-0.1984	-0.1175	-0.0415	-0.0148	-0.0898	0.2817	-0.1731
APPLE-29	0.0705	-0.0973	-0.0116	-0.0594	0.0389	-0.0177	0.0930	0.0609	0.1696	0.0352
APPLE-30	0.4022	0.2852	0.2512	-0.1079	-0.0006	-0.0170	0.1018	-0.0752	0.2125	-0.0508

Grade 5 Math (continued)

	WD----11	WD----12	WD----13	WD----14	WD----15	WD----16	WD----17	WD----18	WD----19	WD----20
APPLE-31	-0.1355	0.0224	-0.1249	-0.1355	-0.1448	-0.1031	0.0210	0.0570	-0.1701	0.0611
APPLE-32	0.0476	-0.1635	0.0834	-0.1482	-0.1000	-0.0476	0.0712	0.0343	-0.1160	0.2982
APPLE-33	-0.1318	0.0013	0.0555	-0.0825	-0.0770	-0.0835	-0.1499	0.0987	0.1447	-0.0766
APPLE-34	-0.0530	0.0043	-0.0515	-0.0972	-0.0675	-0.0563	-0.0158	0.1881	0.1879	0.0301
APPLE-35	-0.1439	-0.1370	-0.1355	-0.0739	-0.0790	-0.0563	-0.2185	-0.4337	0.1455	-0.0808
APPLE-36	-0.0997	-0.1240	-0.1850	-0.1261	-0.1347	-0.0960	0.0858	0.1428	0.0828	-0.0666
APPLE-37	-0.0907	-0.0088	0.0130	0.1130	0.1011	-0.0170	-0.1167	-0.0831	-0.0485	-0.1098
APPLE-38	0.1065	0.0669	-0.1959	0.0545	0.0071	0.0274	0.2494	0.2108	0.0793	0.0764
APPLE-39	0.1578	-0.0331	0.0296	-0.0773	-0.1028	-0.1063	-0.0793	-0.1672	0.1629	-0.1410
APPLE-40	0.1712	0.0967	0.3472	-0.2036	-0.2176	-0.1550	-0.0022	-0.1255	0.0042	0.4804
APPLE-41	0.2845	0.1821	0.1030	-0.1254	-0.0442	-0.0472	0.0284	-0.0673	0.0209	0.0619
APPLE-42	0.0082	0.1342	0.1324	-0.0569	0.0396	0.0201	-0.0419	-0.1761	0.0212	0.0858
APPLE-43	-0.0560	0.0275	-0.0375	-0.0419	-0.0532	-0.1103	-0.0798	-0.2704	0.0581	0.2025
APPLE-44	0.0986	-0.0796	0.1045	-0.1470	0.0311	0.1059	0.0459	-0.0922	0.1749	0.0314
APPLE-45	-0.0455	0.0233	0.0851	-0.0572	-0.0084	-0.1343	-0.0111	0.1898	0.1898	0.0437
APPLE-46	0.2364	0.2571	-0.1359	-0.2636	-0.0614	0.0116	0.0520	-0.0679	0.2823	0.1425
APPLE-47	0.2102	0.2433	0.0822	-0.0766	-0.0482	-0.0498	0.1555	0.0148	0.2592	-0.1584
APPLE-48	0.2376	0.2937	0.0356	0.1591	0.2232	0.1731	-0.0433	-0.0314	0.2831	-0.1926
APPLE-49	0.2115	0.1396	0.2651	-0.1371	-0.1458	-0.0921	0.0720	0.0355	-0.0127	-0.0249
APPLE-50	-0.1914	-0.1962	-0.1780	-0.0565	-0.1857	-0.0727	0.0310	0.1148	0.0709	-0.0911
CATCN-GN	0.1495	0.1032	0.0969	-0.1035	0.1053	0.0663	-0.2527	-0.2310	-0.1343	-0.0297
CATCM-GN	0.0637	0.0576	0.0334	0.0367	0.0419	0.0235	0.0871	-0.0236	-0.0542	0.0728
MTHAP-GN	0.0788	0.0180	-0.1618	0.0971	0.1826	0.2634	0.1878	-0.0439	0.1339	0.1610
TOTMA-GN	0.1231	0.0707	-0.0440	0.0691	0.1809	0.2015	0.0591	-0.0942	0.0440	0.1201

	WC----21	WC----22	WC----23	WD----24	WD----25	WD----26	WD----27	WD----28	WD----29	WD----30
WC-----1	C.0210	C.3658	0.0137	0.1982	0.1884	-0.1621	0.1886	0.1781	-0.0780	0.2290
WC-----2	0.1405	0.1496	-0.1825	-0.0219	-0.1129	-0.1352	-0.0403	0.1350	0.1385	-0.0786
WD-----3	-C.0556	0.1162	-0.1410	-0.0417	-0.1146	-0.1728	-0.0817	0.0306	0.0027	0.1806
WC-----4	C.1714	C.1960	-0.2512	0.2089	0.1536	0.1382	0.1735	0.0859	0.0559	-0.0068
WC-----5	0.1239	0.0632	-0.3392	-0.0575	-0.1578	-0.1746	-0.0115	0.1875	0.0126	-0.1777
WD-----6	0.0336	-0.0808	0.1460	0.5879	0.6215	0.5231	0.4064	-0.2938	0.0141	0.2384
WD-----7	0.0815	-0.0789	0.1165	0.8327	0.8452	0.7115	0.8890	-0.3653	0.0339	0.1779
WC-----8	0.1002	0.0815	-0.2097	0.1990	0.0880	-0.1552	0.1782	-0.0665	0.1461	0.0683
WC-----9	-0.0397	-C.1649	0.0141	0.3580	0.2848	0.1147	0.3049	-0.1679	0.0992	0.0312
WC----10	-0.7221	-C.0043	-0.1794	0.3304	0.1900	0.0741	0.3060	-0.2024	-0.0099	-0.0684
WD----11	-0.0894	-C.2496	-0.1135	-0.0121	0.0359	0.1577	-0.0327	0.1292	-0.0505	-0.1325
WC----12	-0.0054	-C.1896	-0.0929	0.0749	0.1290	0.2309	0.0742	0.0654	-0.0241	0.0676
WD----13	0.0738	-0.2798	-0.2002	-0.0586	-0.0168	0.0553	0.0029	-0.0103	-0.0232	-0.0105
WC----14	0.1299	0.1307	-0.0569	0.7710	0.6420	0.4215	0.8602	-0.3203	0.0133	0.1155
WC----15	0.1096	-0.0654	0.1210	0.7987	0.8961	0.7299	0.8836	-0.3434	0.0296	0.1235
WC----16	-0.0092	-C.1115	0.1097	0.8203	0.9120	0.8191	0.7650	-0.1226	0.0445	0.0440
WC----17	-0.0061	-C.1758	0.0267	0.0532	0.0524	-0.0532	-0.0035	0.1195	0.0571	0.1010
WD----18	C.0677	-C.0974	0.0629	0.0756	0.1071	-0.0066	0.0956	0.0460	0.0548	0.1231
WC----19	-C.3947	-C.1453	0.0794	-0.0082	0.0546	0.0553	-0.0352	0.1151	-0.1420	-0.1354
WC----20	-0.1426	-C.2224	0.0780	-0.0853	-0.0545	-0.1577	-0.0969	0.1875	-0.1643	0.0245
WD----21	1.0000	-C.1073	-0.4117	-0.0304	0.0072	0.0135	0.0859	-0.1015	0.2768	0.0362
WD----22	-C.1073	1.0000	-0.0293	0.1169	-0.0449	-0.1079	0.0989	0.1530	-0.0836	0.0060
WC----23	-0.4117	-C.0293	1.0000	0.1210	0.1779	0.0639	0.0317	0.0329	-0.1185	0.1708
WD----24	-C.0304	0.1169	0.1210	1.0000	0.8961	0.7299	0.8836	-0.2187	0.0340	0.1614
WC----25	C.0072	-C.0449	0.1779	0.8961	1.0000	0.8130	0.7823	-0.1985	0.0302	0.1551
WC----26	0.0135	-C.1079	0.0639	0.7299	0.8130	1.0000	0.6801	-0.1983	0.0452	-0.0122
WC----27	0.0859	0.0989	0.0317	0.8836	0.7823	0.6801	1.0000	-0.3255	0.0329	0.1074
WC----28	-0.1015	0.1530	0.0329	-0.2187	-0.1985	-0.1983	-0.3255	1.0000	-0.0648	-0.1008
WC----29	0.2768	-0.0836	-0.1185	0.0340	0.0302	0.0452	0.0329	-0.0648	1.0000	0.2275
WC----30	0.0362	0.0060	0.1708	0.1614	0.1551	-0.0122	0.1074	-0.1008	0.2275	1.0000

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Grade 5 Math (continued)

	WD----21	WD----22	WD----23	WD----24	WD----25	WD----26	WD----27	WD----28	WD----29	WD----30
RAMOS--1	-0.1677	-0.1306	-0.1929	-0.1160	-0.1642	-0.0855	-0.1601	0.1049	-0.0084	-0.1117
RAMOS--2	-0.0559	-0.1954	-0.1935	-0.0730	-0.0105	0.0726	-0.0984	0.0506	-0.1557	-0.0275
RAMOS--3	-0.1382	0.0109	-0.0476	-0.0853	-0.1738	-0.1577	-0.1126	0.0703	0.1237	-0.1002
RAMOS--4	0.0767	-0.1129	-0.1062	-0.1181	-0.1076	-0.0770	-0.1203	0.1229	-0.1018	-0.0231
RAMOS--5	-0.1390	0.2057	-0.0182	0.4763	0.1638	0.2360	0.4405	-0.0886	-0.0246	-0.0198
RAMOS--6	-0.1893	-0.1359	-0.0325	0.1438	0.1806	0.2707	0.1252	0.0726	-0.0578	-0.1007
RAMOS--7	0.0180	0.0807	-0.3160	0.0645	-0.0247	-0.0525	0.0252	0.0482	0.0254	-0.1417
RAMOS--8	-0.1181	-0.1938	0.0622	-0.1191	-0.0849	0.0071	-0.1316	0.1187	-0.1741	-0.0962
RAMOS--9	-0.1206	-0.0552	-0.2126	-0.0944	-0.1820	-0.1543	-0.1132	0.1621	-0.0950	-0.1667
RAMOS-10	-0.1717	-0.1271	0.0163	0.0360	0.0933	0.2229	0.0107	0.0871	-0.1095	-0.0267
RAMOS-11	-0.1592	0.0603	-0.0530	-0.1899	-0.2365	-0.1870	-0.1124	0.1668	-0.0312	-0.2244
RAMOS-12	-0.2047	-0.2048	-0.1687	-0.1164	-0.0874	-0.0090	-0.1266	-0.0270	-0.0974	0.0432
RAMOS-13	0.0886	-0.1635	-0.0919	-0.1538	-0.1401	-0.1002	-0.1566	-0.0550	-0.0687	-0.0838
RAMOS-14	-0.1824	-0.0885	0.1316	-0.0078	0.0241	0.1064	-0.0214	0.1144	-0.1224	0.0906
RAMOS-15	-0.0553	-0.0046	-0.2540	0.0363	-0.0626	-0.0790	-0.0145	0.0828	-0.0295	-0.1542
RAMOS-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RAMOS-17	-0.3357	-0.2542	-0.0838	-0.0848	-0.0422	0.0700	-0.1014	-0.0004	-0.0973	-0.1213
RAMOS-18	-0.0803	-0.0576	-0.0980	-0.0543	-0.0494	-0.0354	-0.0553	0.0794	-0.0386	0.0429
RAMOS-19	-0.0344	0.1405	0.0916	-0.0532	-0.0328	-0.0066	-0.0205	0.1141	-0.0663	0.1280
RAMOS-20	0.2638	0.0225	-0.1746	-0.0718	-0.0582	-0.0211	-0.0762	0.1548	0.0024	-0.0583

	WD----21	WD----22	WD----23	WD----24	WD----25	WD----26	WD----27	WD----28	WD----29	WD----30
APPLE--1	0.0214	-0.0598	0.0547	-0.0324	-0.0119	0.0408	-0.0406	0.1571	-0.0598	-0.2782
APPLE--2	-0.2179	-0.1454	0.0894	-0.1355	-0.1050	-0.0337	-0.1101	0.1855	-0.1650	-0.0753
APPLE--3	-0.2376	-0.1224	0.3104	-0.0055	0.0318	0.0759	0.0155	0.0239	-0.1389	0.1185
APPLE--4	-0.1254	0.2662	0.0359	-0.0170	-0.0221	-0.2245	-0.0669	0.3051	-0.2737	-0.1484
APPLE--5	0.0096	-0.1955	-0.1173	-0.0955	-0.0680	0.0046	0.0441	-0.1689	-0.0375	-0.1751
APPLE--6	0.0051	-0.1206	0.2345	0.0766	0.1340	0.1141	0.1204	-0.1268	-0.1314	0.0894
APPLE--7	-0.2292	-0.0619	0.0881	-0.0956	-0.0860	-0.1107	-0.1304	0.2026	-0.1527	0.0361
APPLE--8	-0.2823	0.1234	0.0341	0.0186	0.0568	0.0308	-0.0878	-0.0349	-0.0930	-0.1723
APPLE--9	-0.2611	0.2401	-0.1819	-0.0882	-0.0632	-0.0744	-0.1316	0.0466	-0.1736	-0.1165
APPLE-10	0.0124	0.0090	-0.0401	-0.0294	-0.0033	-0.0855	-0.0814	0.1456	0.0421	-0.0432
APPLE-11	0.0681	0.0457	-0.2516	-0.0876	-0.1679	-0.0983	-0.0570	-0.0433	-0.1219	0.0436
APPLE-12	-0.1791	0.0198	0.1422	0.0298	0.0624	-0.0003	-0.0061	0.0222	-0.0259	0.0135
APPLE-13	0.2258	-0.0159	-0.0919	-0.1271	-0.1057	-0.0938	-0.0784	0.0537	0.1648	0.0945
APPLE-14	0.1007	-0.0653	-0.0266	-0.1564	-0.1490	-0.1189	-0.1373	0.1053	0.0269	0.1057
APPLE-15	0.0370	0.0086	-0.0796	0.0468	0.0047	0.0104	0.2023	-0.3133	-0.1298	0.1442
APPLE-16	-0.1921	0.1407	-0.1963	0.1260	-0.0845	-0.0688	0.1492	-0.1909	-0.0505	-0.0154
APPLE-17	0.0867	0.1263	-0.1619	0.1594	-0.0837	-0.0159	0.2790	-0.2162	-0.0468	0.1337
APPLE-19	-0.2837	0.1404	0.1464	-0.0590	-0.1281	-0.1156	-0.1069	-0.0017	-0.0022	-0.0848
APPLE-20	0.2295	0.1009	-0.2245	0.0239	0.0837	-0.1426	-0.0348	0.2390	-0.1898	0.0490
APPLE-21	-0.1265	0.2680	0.0405	-0.0367	-0.0242	0.0087	-0.0414	0.1030	-0.0724	-0.0913
APPLE-22	-0.2433	-0.1061	0.1497	-0.1826	-0.1427	-0.0360	-0.1460	-0.0855	-0.0776	0.0944
APPLE-23	0.0350	-0.1948	-0.1191	-0.1120	-0.0773	-0.0625	-0.1249	0.1820	-0.2052	-0.1155
APPLE-24	-0.1992	-0.0966	0.4347	0.1187	0.1684	0.1844	0.0950	0.0810	-0.0999	0.0876
APPLE-25	-0.1511	0.0790	0.3067	-0.1330	-0.1225	-0.0918	-0.1350	-0.0445	-0.0267	0.0299
APPLE-26	-0.0342	0.1127	-0.0687	-0.1177	-0.0865	-0.0929	-0.1289	-0.0846	-0.0718	-0.0561
APPLE-27	-0.0759	0.0548	-0.0123	0.1089	0.1461	0.1255	0.2249	-0.2242	-0.0441	0.0439
APPLE-28	-0.0352	-0.0964	-0.0181	-0.1175	-0.0923	-0.0251	-0.1261	0.1941	-0.1038	-0.0070
APPLE-29	-0.1417	-0.0923	0.1773	-0.0140	0.0080	0.0038	-0.0394	0.0052	-0.0964	-0.2309
APPLE-30	-0.0221	0.1040	-0.1696	-0.0006	0.0447	0.0078	-0.0202	0.1841	-0.1189	-0.0252

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Grade 5 Math (continued)

	WC----21	WC----22	WC----23	WD----24	WD----25	WD----26	WD----27	WD----28	WD----29	WD----30
APPLE-31	0.3237	-0.0316	-0.0853	-0.1448	-0.1334	-0.0999	-0.1470	0.2016	-0.1176	-0.1751
APPLE-32	-0.1587	-0.0689	-0.1334	-0.0921	-0.0809	-0.0293	-0.0989	0.1045	-0.0938	-0.1434
APPLE-33	0.0155	-0.0075	-0.0378	-0.0949	-0.0840	-0.0582	-0.1196	0.0243	-0.1116	-0.1243
APPLE-34	-0.1762	-0.0562	-0.1532	-0.0820	-0.0623	-0.0099	-0.0753	-0.3190	0.0294	0.1174
APPLE-35	-0.0808	-0.0552	-0.0976	-0.0790	-0.0728	-0.0545	-0.0802	-0.2110	0.0636	-0.1001
APPLE-36	-0.1546	0.1329	0.0712	-0.1347	-0.1241	-0.0929	-0.1368	0.1849	-0.1037	0.0243
APPLE-37	-0.0663	0.3084	-0.1016	-0.0666	-0.0499	-0.0845	0.0855	-0.0625	-0.0445	-0.1911
APPLE-38	-0.0864	0.0438	0.0599	0.1165	0.0730	-0.0805	0.0841	0.2264	-0.2299	0.1567
APPLE-39	-0.0142	-0.0313	0.1814	-0.0712	-0.1195	-0.0656	-0.0700	0.0500	-0.1579	-0.1932
APPLE-40	-0.2110	-0.1753	-0.1836	-0.2176	-0.2004	-0.1501	-0.2209	0.2146	-0.1403	0.1603
APPLE-41	-0.0339	-0.0474	0.1438	0.0062	-0.0001	-0.0029	-0.0452	0.1108	-0.1513	-0.0114
APPLE-42	-0.1098	-0.0523	-0.0456	0.0112	0.0575	-0.0047	-0.0084	-0.0692	-0.0752	0.0805
APPLE-43	-0.1146	0.0593	-0.2086	-0.1549	-0.1427	-0.1069	-0.0614	-0.1184	-0.0349	-0.0380
APPLE-44	-0.0699	-0.1562	-0.0279	0.0311	0.0602	0.1327	0.0179	-0.0532	-0.0161	-0.2948
APPLE-45	-0.2829	0.1036	0.1153	-0.1420	-0.0700	-0.2195	-0.0947	0.2256	-0.4581	-0.1318
APPLE-46	-0.1027	-0.0156	0.0523	-0.0431	-0.0141	0.0917	-0.0752	0.0807	-0.1137	-0.1252
APPLE-47	-0.0187	-0.1105	-0.1864	-0.1006	-0.0731	-0.0337	-0.0859	-0.1462	0.0106	0.1254
APPLE-48	-0.0749	0.1388	0.1664	0.1283	0.1696	0.0877	0.1526	-0.0962	-0.0688	0.0335
APPLE-49	0.1320	-0.1211	-0.1977	-0.1105	-0.1198	-0.0791	-0.1210	0.0364	0.1412	0.0999
APPLE-50	-0.1150	0.1326	-0.0394	-0.0392	-0.1486	-0.1116	-0.0601	0.1185	-0.1120	-0.0649
CATCN-GN	0.0574	-0.1106	0.2105	0.0307	0.0886	0.1444	0.0277	-0.1531	0.1898	-0.0230
CATCM-GN	0.1685	0.0472	0.0636	0.1081	0.0344	0.0323	0.1400	-0.0105	0.0683	0.0191
MTHAP-GN	-0.2558	-0.0248	0.2124	0.2665	0.2633	0.2349	0.1803	0.0964	-0.2811	-0.1706
TOTMA-GN	-0.1080	-0.0273	0.2279	0.2293	0.2087	0.2073	0.1999	-0.0258	-0.1545	-0.1187

Grade 5 Math (continued)

	RAMOS--1	RAMOS--2	RAMOS--3	RAMOS--4	RAMOS--5	RAMOS--6	RAMOS--7	RAMOS--8	RAMOS--9	RAMOS-10
WC-----1	-0.0088	-0.0946	0.0715	-0.0474	-0.0051	-0.2049	0.2044	-0.1956	0.1068	-0.2411
WC-----2	0.1519	0.1931	0.0248	-0.1934	0.1221	-0.2454	0.1701	-0.0262	0.1796	-0.1015
WC-----3	0.1516	-0.0394	0.2117	-0.1276	0.0132	-0.0463	-0.0296	0.1998	0.1268	0.1585
WC-----4	0.0197	0.2287	-0.1665	-0.0530	0.1979	-0.1717	0.0288	-0.2198	-0.0504	-0.0174
WC-----5	0.0298	0.1376	-0.0726	-0.1351	0.1466	-0.0546	0.1536	-0.1199	0.0426	0.0334
WC-----6	-0.0536	0.0072	-0.0635	-0.0784	0.0998	-0.0371	0.1281	-0.1531	-0.0049	-0.1345
WC-----7	-0.1929	-0.0741	-0.1582	-0.1127	0.2206	0.0759	0.0052	-0.1441	-0.1356	-0.0491
WC-----8	-0.0040	0.0098	-0.0269	0.0532	0.1975	0.0153	0.0868	0.0455	0.0184	0.1256
WC-----9	0.0363	0.0493	-0.0133	0.0082	0.2871	0.1213	0.0663	0.0571	0.0597	0.1713
WC----10	-0.0246	0.0109	-0.0435	-0.1343	0.3933	0.0467	0.0139	-0.0789	-0.0645	0.0821
WC----11	0.0366	0.1491	-0.0705	0.0045	-0.1273	0.3915	-0.1345	0.2036	-0.0848	0.3890
WC----12	-0.0864	0.1051	-0.1978	0.2356	-0.0626	0.4915	-0.0997	0.0066	-0.1435	0.3353
WC----13	0.1549	0.0376	0.1361	0.1046	-0.0380	0.4934	0.1380	-0.1807	0.1527	0.0393
WC----14	-0.1771	-0.1309	-0.1081	-0.1181	0.4763	-0.0192	0.1051	-0.2213	-0.0758	-0.1426
WC----15	-0.2026	-0.0730	-0.1651	-0.1181	0.1342	0.1438	-0.0283	-0.1191	-0.1687	0.0360
WC----16	-0.1869	-0.0087	-0.2035	-0.0898	0.1887	0.2126	-0.0855	-0.0411	-0.2154	0.1389
WC----17	-0.0338	0.2744	-0.2608	-0.0147	0.1640	0.0273	-0.0832	0.1537	-0.1744	0.4049
WC----18	-0.0840	0.0726	-0.1522	-0.0316	0.0790	-0.0769	-0.0798	0.0196	-0.1908	0.2790
WC----19	0.0854	0.1389	-0.0178	0.0799	-0.1060	0.2358	-0.0917	0.2092	0.0429	0.2133
WC----20	0.2707	0.3334	0.0164	0.1703	0.0265	-0.1499	0.1528	0.0337	0.2716	-0.0144
WC----21	-0.1677	-0.0559	-0.1382	0.0767	-0.1390	-0.1893	0.0180	-0.1181	-0.1206	-0.1717
WC----22	-0.1306	-0.1954	0.0109	-0.1129	0.2057	-0.1359	0.0807	-0.1938	-0.0552	-0.1271
WC----23	-0.1929	-0.1935	-0.0476	-0.1062	-0.0182	-0.0325	-0.3160	0.0622	-0.2126	0.0163
WC----24	-0.1160	-0.0730	-0.0853	-0.1181	0.4763	0.1438	0.0645	-0.1191	-0.0944	0.0360
WC----25	-0.1642	-0.0105	-0.1738	-0.1076	0.1638	0.1806	-0.0247	-0.0849	-0.1820	0.0733
WC----26	-0.0855	0.0726	-0.1577	-0.0770	0.2360	0.2707	-0.0325	0.0071	-0.1543	0.2229
WC----27	-0.1601	-0.0984	-0.1126	-0.1203	0.4405	0.1252	0.0252	-0.1316	-0.1132	0.0107
WC----28	0.1049	0.0506	0.0703	0.1229	-0.0886	0.0726	0.0482	0.1187	0.1621	0.0871
WC----29	-0.0084	-0.1557	0.1237	-0.1018	-0.0246	-0.0578	0.0254	-0.1741	-0.0950	-0.1095
WC----30	-0.1117	-0.0275	-0.1002	-0.0231	-0.0198	-0.1007	-0.1417	-0.0962	-0.1667	-0.0267

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Grade 5 Math (continued)

	RAMOS--1	RAMOS--2	RAMOS--3	RAMOS--4	RAMOS--5	RAMOS--6	RAMOS--7	RAMOS--8	RAMOS--9	RAMOS-10
RAMOS--1	1.0000	0.4599	0.7220	0.3820	-0.0085	0.1707	0.5454	0.2954	0.8354	0.2698
RAMOS--2	0.4599	1.0000	-0.2767	0.1061	-0.1240	0.0503	0.0539	0.1832	0.1464	0.3873
RAMOS--3	0.7220	-0.2767	1.0000	0.2567	0.0450	0.1186	0.5649	0.1470	0.7895	-0.0211
RAMOS--4	0.3820	0.1061	0.2567	1.0000	-0.0753	0.3387	-0.0239	0.4513	0.3113	0.1389
RAMOS--5	-0.0085	-0.1240	0.0450	-0.0753	1.0000	0.0373	0.0987	-0.0370	0.0250	0.1043
RAMOS--6	0.1707	0.0503	0.1186	0.3387	0.0373	1.0000	-0.1067	0.0656	0.0090	0.3630
RAMOS--7	0.5454	0.0539	0.5649	-0.0239	0.0987	-0.1067	1.0000	-0.3465	0.7071	-0.0664
RAMOS--8	0.2954	0.1832	0.1470	0.4513	-0.0370	0.0656	-0.3465	1.0000	0.2089	0.3882
RAMOS--9	0.8354	0.1464	0.7895	0.3113	0.0250	0.0090	0.7071	0.2089	1.0000	-0.0358
RAMOS-10	0.2698	0.3873	-0.0211	0.1389	0.1043	0.3630	-0.0664	0.3882	-0.0358	1.0000
RAMOS-11	0.5261	-0.0954	0.6515	0.0980	0.0637	-0.0096	0.6071	-0.0211	0.6984	0.0292
RAMOS-12	0.2383	0.3014	0.0413	-0.0919	-0.0756	0.0809	0.1429	0.0419	0.1880	0.1411
RAMOS-13	0.1707	0.2103	0.0074	0.1762	0.0380	0.0246	-0.0720	0.2124	0.0354	0.0243
RAMOS-14	0.2437	0.0817	0.2025	0.0681	-0.0102	0.4168	0.1018	-0.0294	0.1826	0.3513
RAMOS-15	0.7778	0.0892	0.7721	0.2845	0.0351	-0.0648	0.7548	0.1313	0.9167	-0.0371
RAMOS-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RAMOS-17	0.2682	0.4636	-0.0812	0.1006	0.1385	0.2205	-0.0179	0.2410	0.0662	0.5447
RAMOS-18	0.0643	0.0678	-0.0136	0.3727	-0.0346	0.7939	-0.1280	-0.0713	-0.1010	0.2859
RAMOS-19	0.0615	-0.0942	0.1398	0.0437	-0.0182	0.0782	-0.1203	0.3579	0.0470	0.4288
RAMOS-20	-0.1673	0.0282	-0.1977	-0.0891	-0.0709	-0.0657	0.0333	0.0275	-0.1308	0.3713

	RAMOS--1	RAMOS--2	RAMOS--3	RAMOS--4	RAMOS--5	RAMOS--6	RAMOS--7	RAMOS--8	RAMOS--9	RAMOS-10
APPLE--1	-0.1078	-0.1697	0.0281	-0.1116	-0.0887	0.0924	-0.1667	0.2566	-0.0134	-0.102
APPLE--2	0.0611	0.4073	-0.2464	-0.1018	0.0392	-0.0200	-0.1876	0.1032	-0.0462	0.1787
APPLE--3	0.1255	0.0292	0.1045	0.0890	0.0970	-0.0721	-0.1833	0.4472	0.0983	0.1568
APPLE--4	0.0186	-0.1076	0.1104	0.0045	-0.0979	0.0169	0.0539	0.0287	0.0815	-0.1077
APPLE--5	0.1937	0.3493	-0.0476	-0.1647	0.0609	-0.0849	0.1786	-0.0150	0.0551	0.5257
APPLE--6	-0.0752	0.0860	-0.1506	-0.1085	0.1662	-0.0163	-0.2295	0.0632	-0.0956	0.0864
APPLE--7	-0.0040	0.0583	-0.0609	0.1525	-0.0715	0.0906	-0.0079	-0.0224	0.0163	-0.0775
APPLE--8	0.2276	-0.1355	0.3709	-0.0350	-0.1164	0.1952	0.3273	-0.0378	0.3709	-0.1328
APPLE--9	0.1123	-0.0861	0.1746	0.1774	0.0599	0.2206	-0.0616	0.1390	0.1089	0.0702
APPLE-10	0.0378	-0.1763	0.1819	0.0073	-0.0176	-0.0886	0.1391	-0.0953	0.0834	-0.1345
APPLE-11	0.1109	0.1713	-0.0364	0.2504	0.0439	-0.1042	0.1219	0.0910	0.1444	-0.0586
APPLE-12	0.1430	0.1712	0.0263	0.0432	-0.1105	-0.0571	0.2596	0.0177	0.1166	0.3094
APPLE-13	0.0366	-0.0880	0.1180	-0.0430	-0.0705	-0.0155	0.0930	-0.1171	0.0400	0.0291
APPLE-14	-0.0686	-0.0518	-0.0325	0.0199	-0.1033	-0.0015	0.0891	-0.1998	-0.0514	-0.0595
APPLE-15	0.0326	0.1389	-0.0768	-0.0923	0.2353	-0.1071	-0.0329	0.0508	0.0400	0.1823
APPLE-16	0.1736	0.0457	0.1447	-0.1219	0.4906	-0.1064	0.3068	-0.1026	0.2650	-0.0124
APPLE-17	0.0306	-0.3476	0.2911	-0.0081	0.3756	-0.0601	0.2913	-0.1661	0.2213	-0.1835
APPLE-19	0.2145	-0.2233	0.4049	0.1322	-0.0057	0.0800	0.1808	0.0536	0.2257	-0.0281
APPLE-20	-0.0633	-0.0631	-0.0203	0.0510	-0.1066	-0.0830	0.0977	-0.0057	0.1547	-0.1632
APPLE-21	-0.0202	-0.0180	-0.0004	-0.0618	-0.0468	-0.0389	0.1239	-0.0843	0.0806	-0.0522
APPLE-22	0.0372	0.3530	-0.2299	-0.0298	-0.0970	0.0607	-0.1534	0.0746	-0.2061	0.3793
APPLE-23	0.0397	0.2875	-0.1821	-0.0464	0.0681	-0.0322	-0.0875	0.1839	0.1139	0.0818
APPLE-24	-0.2560	-0.1582	-0.1688	-0.0242	0.1900	0.1754	-0.2199	0.0486	-0.2179	0.0838
APPLE-25	-0.1825	-0.2246	-0.0149	-0.0830	-0.0847	-0.1084	-0.0815	-0.0990	-0.1099	-0.1980
APPLE-26	-0.0647	0.1003	-0.1582	0.1011	-0.0548	-0.0585	-0.0694	0.1091	-0.0905	-0.0502
APPLE-27	-0.0245	-0.1676	0.0826	0.1894	0.1035	0.0891	-0.0196	0.0988	0.0813	-0.0673
APPLE-28	0.2048	0.0592	0.1222	0.3469	-0.0616	0.1862	-0.2557	0.5125	0.1724	0.1109
APPLE-29	-0.0258	-0.2787	0.2106	-0.1709	-0.0714	-0.0468	0.1666	-0.1591	0.1029	-0.1817
APPLE-30	0.2250	0.2366	0.0649	0.0584	-0.1114	0.3279	0.2025	-0.1938	0.0712	0.2819

Grade 5 Math (continued)

	RAMOS--1	RAMOS--2	RAMOS--3	RAMOS--4	RAMOS--5	RAMOS--6	RAMOS--7	RAMOS--8	RAMOS--9	RAMOS-10
APPLE-31	0.1288	0.0083	0.1011	0.4110	-0.0188	0.0620	0.1321	0.0925	0.1818	0.1727
APPLE-32	0.2660	0.3338	0.0431	-0.0666	-0.0662	0.0593	0.1038	0.0852	0.2659	0.0206
APPLE-33	0.1993	-0.2562	0.4044	0.2595	-0.0475	-0.0522	0.3035	-0.0587	0.3079	-0.1596
APPLE-34	0.1879	0.3086	-0.0363	0.0362	-0.0154	-0.0652	-0.1870	0.0685	-0.0653	0.1650
APPLE-35	0.1023	0.0801	0.0433	0.1140	-0.0502	-0.0684	0.0172	0.0637	0.0497	-0.0988
APPLE-36	-0.1802	-0.2298	-0.0078	-0.1080	-0.0473	-0.1169	-0.1408	0.3017	-0.0594	0.1975
APPLE-37	-0.0693	-0.1557	0.0477	0.0197	-0.0785	0.0973	0.0419	-0.1427	-0.0258	-0.0865
APPLE-38	-0.1938	0.1166	-0.2991	-0.1924	0.1503	-0.1133	-0.1036	0.1421	-0.0707	0.1857
APPLE-39	0.1639	-0.1009	0.2475	0.1347	0.0685	0.1624	0.0054	0.0277	0.1357	0.1395
APPLE-40	0.4341	0.3159	0.2326	0.0621	-0.0438	0.1761	0.2594	-0.0603	0.4024	0.1862
APPLE-41	0.0270	-0.0678	0.0573	0.3377	-0.0835	0.0640	-0.1004	0.2560	0.0241	0.0062
APPLE-42	-0.0029	0.0987	-0.0867	0.0972	-0.0695	0.2831	0.0864	-0.1784	0.0687	0.1235
APPLE-43	-0.1006	0.1188	-0.1902	-0.1243	-0.0988	-0.1346	0.0081	-0.1653	0.0699	-0.2291
APPLE-44	0.2344	-0.0527	0.3159	-0.1155	-0.0259	0.2574	0.2678	0.0101	0.2700	0.0172
APPLE-45	-0.0210	-0.1250	0.0712	0.0730	-0.0493	0.0052	0.1007	0.0096	0.1330	-0.0551
APPLE-46	-0.0983	0.1049	-0.1803	-0.1381	-0.0007	0.0030	-0.1789	0.2797	-0.0921	0.2092
APPLE-47	0.0749	0.3378	-0.1747	-0.0499	-0.0806	0.0299	-0.0119	0.0113	-0.0741	0.2753
APPLE-48	-0.2147	-0.1303	-0.1517	0.1700	-0.0192	0.2433	-0.2528	0.0629	-0.1874	-0.0350
APPLE-49	0.0776	-0.0252	0.1122	-0.0515	-0.0152	0.0445	0.1129	-0.0765	0.0926	-0.0559
APPLE-50	0.0277	-0.0629	0.0776	-0.0369	0.1280	0.0044	-0.1121	-0.0176	-0.0668	0.2136
CATCH-CN	0.0417	0.1438	-0.0546	-0.0312	-0.1835	0.0425	-0.1152	0.0775	-0.0764	0.1371
CATCH-GN	-0.1121	0.0075	-0.1507	0.1603	0.0982	0.0644	-0.2879	0.1680	-0.1639	0.0274
MTHAP-GN	0.0348	0.2818	-0.2000	0.1165	0.1276	0.2009	-0.2084	0.3285	-0.0516	0.2384
TOTMA-GN	0.0114	0.2367	-0.1864	0.0971	0.0768	0.1790	-0.2719	0.2831	-0.1041	0.2302

Grade 5 Math (continued)

	RAMOS-11	RAMOS-12	RAMOS-13	RAMOS-14	RAMOS-15	RAMOS-16	RAMOS-17	RAMOS-18	RAMOS-19	RAMOS-20
WD-----1	0.2126	0.0352	-0.1460	0.0922	0.0718	0.0	-0.1329	-0.0595	0.0090	-0.0582
WD-----2	0.2406	0.0328	-0.0429	0.0661	0.1158	0.0	0.0511	-0.1923	-0.0489	0.1383
WD-----3	0.1720	-0.1781	-0.1522	0.0360	0.0753	0.0	0.1775	0.0	0.3930	0.0724
WD-----4	-0.1024	0.0219	-0.0777	-0.1154	-0.0243	0.0	0.1531	0.0	-0.2505	0.0396
WD-----5	0.0866	0.0027	-0.1301	-0.1419	0.1137	0.0	0.0014	0.0	-0.2058	0.3346
WD-----6	-0.2522	-0.1389	-0.1020	-0.0854	0.0742	0.0	-0.1345	-0.0360	-0.0641	-0.0737
WD-----7	-0.1834	-0.1354	-0.1467	-0.0457	-0.0446	0.0	-0.1225	-0.0518	-0.0474	-0.0781
WD-----8	-0.0265	-0.1145	0.0437	-0.0411	0.0107	0.0	0.1838	0.1938	0.1293	0.0568
WD-----9	0.0170	-0.1662	0.1245	-0.0375	0.0416	0.0	0.2647	0.1260	0.1018	0.0117
WD----10	0.0292	0.0256	-0.0269	0.0811	-0.0294	0.0	0.1220	0.0373	-0.0078	-0.0750
WD----11	-0.1057	0.0420	-0.0370	0.0985	0.0072	0.0	0.1466	0.3197	0.0301	0.0765
WD----12	-0.1842	-0.0335	-0.0790	0.1124	-0.0903	0.0	0.1345	0.4793	-0.0355	0.0876
WD----13	0.0969	0.0900	-0.0281	0.0699	0.1237	0.0	-0.0067	0.4119	0.1006	-0.0311
WD----14	-0.1213	-0.2044	-0.1538	-0.1029	0.0100	0.0	-0.1649	-0.0543	-0.0101	-0.1111
WD----15	-0.1841	-0.1164	-0.1538	-0.0078	-0.0753	0.0	-0.0848	-0.0543	-0.0101	-0.0718
WD----16	-0.1921	-0.0495	-0.1169	0.0591	-0.1196	0.0	0.0086	-0.0413	-0.0323	-0.0396
WD----17	-0.1517	0.1148	-0.0964	0.1138	-0.2065	0.0	0.3180	0.1078	0.1143	0.0409
WD----18	-0.1939	0.0510	0.0948	-0.0937	-0.1398	0.0	-0.0455	0.0335	0.1616	0.2504
WD----19	0.0909	0.0091	0.0965	0.2125	-0.0267	0.0	0.3409	0.1429	0.0601	-0.1707
WD----20	0.2038	0.2741	0.0208	0.0663	0.1950	0.0	0.1103	-0.0803	-0.1126	-0.1645
WD----21	-0.1592	-0.2047	0.0886	-0.1824	-0.0553	0.0	-0.3357	-0.0803	-0.0344	0.2638
WD----22	0.0603	-0.2048	-0.1635	-0.0885	-0.0046	0.0	-0.2542	-0.0576	0.1405	0.0225
WD----23	-0.0530	-0.1687	-0.0919	0.1316	-0.2540	0.0	-0.0838	-0.0980	0.0916	-0.1746
WD----24	-0.1899	-0.1164	-0.1538	-0.0078	0.0363	0.0	-0.0848	-0.0543	-0.0532	-0.0718
WD----25	-0.2365	-0.0874	-0.1401	0.0241	-0.0626	0.0	-0.0422	-0.0494	-0.0328	-0.0582
WD----26	-0.1870	-0.0090	-0.1002	0.1064	-0.0790	0.0	0.0700	-0.0354	-0.0066	-0.0211
WD----27	-0.1124	-0.1266	-0.1566	-0.0214	-0.0145	0.0	-0.1014	-0.0553	-0.0205	-0.0752
WD----28	0.1668	-0.0270	-0.0550	0.1144	0.0828	0.0	-0.0004	0.0794	0.1141	0.1548
WD----29	-0.0312	-0.0974	-0.0687	-0.1224	-0.0295	0.0	-0.0973	-0.0386	-0.0663	0.0024
WD----30	-0.2244	0.0432	-0.0838	0.0906	-0.1542	0.0	-0.1213	0.0429	0.1280	-0.0583

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Grade 5 Math (continued)

	RAMOS-11	RAMOS-12	RAMOS-13	RAMOS-14	RAMOS-15	RAMOS-16	RAMOS-17	RAMOS-18	RAMOS-19	RAMOS-20
RAMOS--1	0.5261	0.2383	0.1707	0.2437	0.7778	0.0	0.2682	0.0643	0.0615	-0.1673
RAMOS--2	-0.0954	0.3014	0.2103	0.0817	0.0892	0.0	0.4636	0.0678	-0.0942	0.0282
RAMOS--3	0.6515	0.0413	0.0074	0.2025	0.7721	0.0	-0.0812	-0.0136	0.1398	-0.1977
RAMOS--4	0.0980	-0.0919	0.1762	0.0681	0.2845	0.0	0.1006	0.3727	0.0437	-0.0891
RAMOS--5	0.0637	-0.0756	0.0380	-0.0102	0.0351	0.0	0.1385	-0.0346	-0.0182	-0.0709
RAMOS--6	-0.0096	0.0809	0.0246	0.4168	-0.0648	0.0	0.2205	0.7939	0.0782	-0.0657
RAMOS--7	0.6071	0.1429	-0.0720	0.1018	0.7548	0.0	-0.0179	-0.1280	-0.1203	0.0333
RAMOS--8	-0.0211	0.0419	0.2124	-0.0294	0.1313	0.0	0.2410	-0.0713	0.3579	0.0275
RAMOS--9	0.6984	0.1880	0.0354	0.1826	0.9167	0.0	0.0662	-0.1010	0.0470	-0.1308
RAMOS-10	0.0292	0.1411	0.0243	0.3513	-0.0971	0.0	0.5447	0.2859	0.4288	0.3713
RAMOS-11	1.0000	-0.1723	-0.0917	0.1803	0.6343	0.0	0.0176	-0.0552	0.1926	0.0539
RAMOS-12	-0.1723	1.0000	0.1671	0.2925	0.0712	0.0	0.1890	0.0165	-0.1210	-0.0436
RAMOS-13	-0.0917	0.1671	1.0000	-0.1188	0.0379	0.0	0.0500	-0.0567	-0.1455	-0.1160
RAMOS-14	0.1803	0.2925	-0.1188	1.0000	-0.0327	0.0	0.2956	0.2705	0.0211	-0.0920
RAMOS-15	0.6343	0.0712	0.0379	-0.0327	1.0000	0.0	-0.1192	-0.1560	-0.0359	-0.1361
RAMOS-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RAMOS-17	0.0176	0.1890	0.0500	0.2956	-0.1192	0.0	1.0000	0.1458	-0.0836	-0.0610
RAMOS-18	-0.0552	0.0165	-0.0567	0.2705	-0.1560	0.0	0.1458	1.0000	0.1391	-0.0409
RAMOS-19	0.1926	-0.1210	-0.1455	0.0211	-0.0359	0.0	-0.0836	0.1391	1.0000	0.2768
RAMOS-20	0.0539	-0.0436	-0.1160	-0.0920	-0.1361	0.0	-0.0610	-0.0409	0.2768	1.0000

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	RAMOS-11	RAMOS-12	RAMOS-13	RAMOS-14	RAMOS-15	RAMOS-16	RAMOS-17	RAMOS-18	RAMOS-19	RAMOS-20
APPLE--1	-0.0604	0.0651	0.3332	0.0842	-0.0350	0.0	-0.2208	-0.0512	0.0531	-0.0653
APPLE--2	-0.0312	0.0474	0.2505	0.2373	-0.2030	0.0	0.3805	-0.1172	-0.1509	0.0058
APPLE--3	0.0710	-0.0472	-0.0207	-0.0363	0.0682	0.0	0.1661	-0.0810	0.1947	-0.1261
APPLE--4	0.1018	-0.1032	0.1399	-0.2751	0.1329	0.0	-0.2148	-0.0251	0.1806	0.1715
APPLE--5	0.0431	0.3611	0.0217	0.2528	-0.0650	0.0	0.5196	-0.0756	0.0703	0.2660
APPLE--6	0.0169	0.0399	0.3000	0.1554	-0.2016	0.0	0.2112	-0.1075	-0.1345	0.0478
APPLE--7	-0.0307	0.2506	-0.2017	0.0306	-0.0069	0.0	-0.0695	0.2280	0.0704	-0.1427
APPLE--8	0.2230	0.0229	0.0077	0.0347	0.4137	0.0	-0.1052	-0.0805	-0.0708	-0.0410
APPLE--9	0.1278	0.0802	0.0495	0.0922	0.0291	0.0	0.1397	0.2378	0.0910	-0.0524
APPLE-10	0.1235	-0.1065	-0.0732	-0.1148	0.1691	0.0	-0.2163	-0.0431	-0.1058	-0.0160
APPLE-11	-0.1592	0.3823	0.0565	-0.0821	0.1515	0.0	-0.0780	-0.0900	-0.1293	-0.1147
APPLE-12	-0.0154	0.1242	-0.1232	0.0710	0.1416	0.0	0.3130	-0.0638	0.1286	0.0379
APPLE-13	0.1672	-0.1053	-0.0908	0.0000	0.0614	0.0	-0.1240	0.0723	-0.0185	0.1319
APPLE-14	-0.0413	0.2504	-0.0010	-0.0903	-0.0499	0.0	-0.0906	0.0959	-0.0543	-0.0264
APPLE-15	0.1040	0.0030	0.0495	0.1463	-0.0338	0.0	0.2692	-0.0689	0.1781	-0.0502
APPLE-16	0.3527	0.0330	-0.0022	0.1792	0.1839	0.0	0.2760	-0.0870	-0.1068	-0.0012
APPLE-17	0.1707	-0.0411	-0.0940	0.1197	0.2734	0.0	-0.1554	-0.0992	-0.1107	-0.1404
APPLE-19	0.1327	-0.1435	-0.1066	-0.0550	0.2797	0.0	-0.1637	0.0979	0.2071	-0.1323
APPLE-20	0.0395	0.1637	-0.0465	-0.0283	0.1126	0.0	-0.1071	-0.1116	-0.0763	0.2065
APPLE-21	0.1819	-0.1128	-0.0982	-0.0844	0.0938	0.0	-0.0940	-0.0346	-0.0234	-0.0503
APPLE-22	-0.1899	0.1641	0.1706	0.2453	-0.2871	0.0	0.4529	0.1095	-0.0148	-0.1849
APPLE-23	0.1710	0.0413	0.0786	-0.0238	0.0341	0.0	0.1884	-0.0894	-0.0757	0.3936
APPLE-24	-0.0073	0.0650	-0.0264	0.1401	-0.2780	0.0	0.0232	0.0390	0.0647	0.1010
APPLE-25	0.0314	-0.1689	-0.1388	-0.1375	-0.0410	0.0	-0.2214	-0.0489	0.0316	-0.0862
APPLE-26	-0.0612	-0.0284	0.1320	0.0229	-0.1227	0.0	0.3061	-0.0245	-0.1371	-0.1326
APPLE-27	-0.0880	-0.0235	-0.0559	-0.0192	0.0796	0.0	-0.0534	-0.0607	0.0117	-0.1069
APPLE-28	0.0433	-0.0814	-0.0513	-0.0041	0.1251	0.0	0.1108	0.1626	0.2255	-0.1073
APPLE-29	0.0936	0.0814	-0.1686	0.1701	0.0880	0.0	-0.0555	-0.0820	-0.1581	-0.1051
APPLE-30	0.0279	0.1824	-0.1557	0.2469	0.1012	0.0	0.1758	0.3580	0.0282	-0.1395

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Grade 5 Math (continued)

	RAMOS-11	RAMOS-12	RAMOS-13	RAMOS-14	RAMOS-15	RAMOS-16	RAMOS-17	RAMOS-18	RAMOS-19	RAMOS-20
APPLE-31	0.2377	-0.0057	0.0466	0.1212	0.1184	0.0	0.0138	0.1276	-0.0805	0.5659
APPLE-32	0.0638	0.3013	0.0800	0.1077	0.1628	0.0	0.1276	-0.0593	0.0284	-0.0505
APPLE-33	0.2011	-0.1280	0.1476	-0.1215	0.3960	0.0	-0.2303	-0.0997	-0.0448	-0.1450
APPLE-34	-0.1285	0.1631	0.4111	-0.0682	-0.0338	0.0	0.1798	-0.0562	-0.1066	-0.0961
APPLE-35	0.1605	-0.0945	-0.0823	-0.0945	0.0140	0.0	0.3170	-0.0290	-0.0682	-0.0511
APPLE-36	0.0240	0.0900	-0.0313	-0.1278	-0.1823	0.0	0.0814	-0.0496	0.6269	0.1883
APPLE-37	0.0649	-0.0657	-0.1407	0.0048	-0.0280	0.0	-0.0102	0.1766	-0.0347	-0.0874
APPLE-38	0.0170	0.0347	-0.0989	0.0504	-0.0971	0.0	0.1115	-0.1164	0.1487	0.3193
APPLE-39	0.1576	-0.1502	-0.1091	0.3867	0.1142	0.0	0.0808	0.1521	0.0745	-0.1502
APPLE-40	0.2133	0.5407	-0.0807	0.4154	0.2807	0.0	0.2448	0.2462	0.0193	-0.1379
APPLE-41	-0.0288	-0.0396	0.1098	-0.0846	0.1385	0.0	-0.1622	-0.0011	-0.0468	0.0815
APPLE-42	0.1707	0.0735	-0.2072	0.2643	-0.0495	0.0	0.3494	0.4115	-0.0860	0.2565
APPLE-43	0.1191	0.0269	-0.1554	0.1063	-0.0548	0.0	0.2220	-0.0571	-0.1064	-0.1005
APPLE-44	0.2599	0.1909	0.0957	0.1412	0.1787	0.0	0.3353	-0.0530	-0.1248	-0.0458
APPLE-45	0.1162	0.1749	0.1839	-0.0761	0.1263	0.0	-0.0992	-0.0786	0.0653	0.0031
APPLE-46	0.0249	0.0296	0.1825	0.0146	-0.1461	0.0	0.2674	-0.0336	0.1735	0.0638
APPLE-47	-0.2056	0.1316	0.1404	-0.0192	-0.0888	0.0	0.4128	0.0735	0.0630	-0.0681
APPLE-48	-0.1921	-0.1328	0.0639	0.1791	-0.1974	0.0	-0.0896	0.2051	-0.0494	-0.0975
APPLE-49	0.2020	-0.0909	-0.0065	-0.0826	0.1330	0.0	-0.0259	0.0564	-0.0847	0.1081
APPLE-50	-0.0218	0.0348	-0.0056	0.1055	-0.1061	0.0	0.1544	0.0274	0.0066	0.2102
CATCM-GN	-0.1158	0.0591	0.0657	-0.1787	-0.0091	0.0	0.0223	0.0459	0.1476	0.0626
CATCM-GN	-0.1865	-0.1432	-0.0210	-0.2261	-0.0782	0.0	-0.0781	0.0152	-0.0813	-0.0310
MTHAP-GN	-0.1142	0.0186	0.1123	0.0470	-0.0792	0.0	0.2625	0.0345	-0.0202	-0.0724
TOTMA-GN	-0.1669	0.0098	0.1105	-0.0786	-0.0759	0.0	0.1438	0.0568	0.0142	-0.0459

	APPLE--1	APPLE--2	APPLE--3	APPLE--4	APPLE--5	APPLE--6	APPLE--7	APPLE--8	APPLE--9	APPLE-10
WD-----1	-0.1645	-0.1228	-0.1326	0.2543	-0.0056	0.0006	0.0820	-0.1070	0.2628	0.0003
WD-----2	0.0507	0.0383	-0.0701	0.1208	0.2090	-0.0620	-0.0949	-0.1366	-0.0877	0.0408
WD-----3	-0.1583	0.0240	0.2278	0.1494	0.0550	-0.1655	-0.0779	-0.0963	-0.0887	-0.0449
WD-----4	-0.2897	-0.0704	-0.1502	0.0152	0.1842	-0.0259	-0.0958	-0.2609	-0.0683	-0.0295
WD-----5	-0.1558	0.1896	-0.0670	0.1691	0.1705	-0.1165	0.0687	0.0113	-0.0484	0.1378
WD-----6	-0.0997	-0.1718	0.0540	-0.0893	-0.1040	0.0897	-0.1651	0.1321	-0.0554	-0.0348
WD-----7	-0.0597	-0.1276	0.0502	-0.1473	0.0151	0.1641	-0.1255	-0.0217	-0.1014	-0.0770
WD-----8	-0.0369	-0.0565	-0.0148	0.0917	0.1741	-0.1163	-0.0076	-0.1641	0.0644	-0.1094
WD-----9	-0.0473	0.0633	0.0040	0.0613	0.1187	-0.0368	-0.1386	-0.0223	-0.1765	0.0812
WD----10	-0.0248	0.0498	-0.0267	-0.0362	0.2040	-0.0152	0.1126	-0.2275	0.1130	0.0839
WD----11	0.2580	-0.0233	-0.0045	0.0359	-0.0307	-0.1788	-0.0393	-0.0011	-0.1879	0.1898
WD----12	0.0237	-0.0844	0.0408	-0.1367	-0.1026	-0.0507	0.0508	-0.0801	-0.1418	0.0177
WD----13	0.0013	-0.0642	-0.0763	-0.0655	0.0034	-0.0995	0.2697	0.0497	0.0575	0.0297
WD----14	-0.1303	-0.1250	-0.1313	-0.0112	0.0809	0.0147	-0.1386	-0.0865	-0.0758	-0.0255
WD----15	-0.0324	-0.1028	0.0337	-0.0475	0.0633	0.1772	-0.1434	0.0186	-0.0994	-0.0433
WD----16	0.0245	-0.0336	-0.0410	-0.1371	-0.0150	0.0773	-0.0163	0.0085	-0.0310	-0.0144
WD----17	-0.2251	0.0886	0.1457	-0.1201	0.3495	-0.1948	0.1325	-0.4036	-0.2308	0.0964
WD----18	-0.1327	0.0392	0.2174	0.0417	0.2358	-0.1072	0.0105	-0.3094	-0.2980	0.1844
WD----19	0.1622	0.0896	0.1883	-0.0948	0.0920	-0.0171	0.2251	-0.1611	0.0264	-0.0625
WD----20	-0.2026	0.2900	0.0369	-0.1067	0.0360	0.0440	0.2902	-0.1060	0.0162	0.0579
WD----21	0.0214	-0.2179	-0.2376	-0.1254	0.0096	0.0051	-0.2292	-0.2823	-0.2611	0.0124
WD----22	-0.0598	-0.1454	-0.1224	0.2662	-0.1955	-0.1206	-0.0619	0.1234	0.2401	0.0090
WD----23	0.0547	0.0894	0.3104	0.0359	-0.1173	0.2345	0.0881	0.0341	-0.1819	-0.0401
WD----24	-0.0324	-0.1355	-0.0055	-0.0170	-0.0955	0.0766	-0.0956	0.0186	-0.0882	-0.0294
WD----25	-0.0119	-0.1050	0.0318	-0.0221	-0.0680	0.1348	-0.0860	0.0568	-0.0632	-0.0033
WD----26	0.0408	-0.0337	0.0759	-0.2245	0.0046	0.1141	-0.1107	0.0308	-0.0744	-0.0855
WD----27	-0.0406	-0.1101	0.0155	-0.0669	0.0441	0.1204	-0.1304	-0.0878	-0.1316	-0.0814
WD----28	0.1571	0.1855	0.0239	0.3051	-0.1689	-0.1268	0.2026	-0.0349	0.0466	0.1456
WD----29	-0.0598	-0.1650	-0.1389	-0.2737	-0.0375	-0.1314	-0.1527	-0.0930	-0.1736	0.0421
WD----30	-0.2782	-0.0753	0.1185	-0.1484	-0.1751	0.0894	0.0361	-0.1723	-0.1165	-0.0432

Grade 5 Math (continued)

	APPLE--1	APPLE--2	APPLE--3	APPLE--4	APPLE--5	APPLE--6	APPLE--7	APPLE--8	APPLE--9	APPLE-10
RAMOS--1	-0.1978	0.0611	0.1255	0.0186	0.1937	-0.0752	-0.0040	0.2276	0.1123	0.0378
RAMOS--2	-0.1697	0.4073	0.0292	-0.1076	0.3493	0.0860	0.0583	-0.1355	-0.0861	-0.1763
RAMOS--3	0.0281	-0.2464	0.1045	0.1104	-0.0476	-0.1506	-0.0609	0.3709	0.1746	0.1819
RAMOS--4	-0.1116	-0.1018	0.0890	0.0045	-0.1647	-0.1085	0.1525	-0.0350	0.1774	0.0073
RAMOS--5	-0.0887	0.0392	0.0970	-0.0979	0.0609	0.1662	-0.0715	-0.1164	0.0599	-0.0176
RAMOS--6	0.0724	-0.0200	-0.0721	0.0169	-0.0849	-0.0163	0.0906	0.1952	0.2206	-0.0886
RAMOS--7	-0.1667	-0.1876	-0.1833	0.0539	0.1786	-0.2295	-0.0079	0.3273	-0.0616	0.1391
RAMOS--8	0.2566	0.1032	0.4472	0.0287	-0.0150	0.0632	-0.0224	-0.0378	0.1390	-0.0953
RAMOS--9	-0.0134	-0.0462	0.0983	0.0815	0.0551	-0.0956	0.0163	0.3709	0.1089	0.0834
RAMOS-10	-0.1029	0.1787	0.1568	-0.1077	0.5257	0.0864	-0.0775	-0.1328	0.0702	-0.1345
RAMOS-11	-0.0604	-0.0312	0.0710	0.1018	0.0431	0.0169	-0.0307	0.2230	0.1278	0.1235
RAMOS-12	0.0651	0.0474	-0.0472	-0.1032	0.3611	0.0399	0.2506	0.0229	0.0802	-0.1065
RAMOS-13	0.3332	0.2505	-0.0207	0.1399	0.0217	0.3000	-0.2017	0.0077	0.0495	-0.0732
RAMOS-14	0.0642	0.2373	-0.0363	-0.2751	0.2528	0.1554	0.0306	0.0347	0.0922	-0.1148
RAMOS-15	-0.0350	-0.2030	0.0682	0.1329	-0.0650	-0.2016	-0.0069	0.4137	0.0291	0.1691
RAMOS-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RAMOS-17	-0.2208	0.3805	0.1661	-0.2148	0.5196	0.2112	-0.0695	-0.1052	0.1397	-0.2163
RAMOS-18	-0.0512	-0.1172	-0.0810	-0.0251	-0.0756	-0.1075	0.2280	-0.0805	0.2378	-0.0431
RAMOS-19	0.0531	-0.1509	0.1947	0.1806	0.0703	-0.1345	0.0704	-0.0708	0.0910	-0.1058
RAMOS-20	-0.0653	0.0058	-0.1261	0.1715	0.2660	0.0478	-0.1427	-0.0410	-0.0524	-0.0160

	APPLE--1	APPLE--2	APPLE--3	APPLE--4	APPLE--5	APPLE--6	APPLE--7	APPLE--8	APPLE--9	APPLE-10
APPLE--1	1.0000	-0.0194	-0.0094	0.1359	-0.1616	0.2837	-0.0641	0.0442	0.0673	0.0365
APPLE--2	-0.0194	1.0000	-0.0638	-0.1505	0.1471	0.2025	0.1044	0.0526	-0.0618	-0.0280
APPLE--3	-0.0094	-0.0638	1.0000	-0.0941	-0.0593	0.3230	0.0369	-0.1220	-0.0286	-0.0393
APPLE--4	0.1359	-0.1505	-0.0941	1.0000	-0.1205	-0.1466	-0.1268	0.1934	-0.0232	-0.0170
APPLE--5	-0.1616	0.1471	-0.0593	-0.1205	1.0000	0.1120	-0.0856	-0.2705	-0.0288	-0.2060
APPLE--6	0.2837	0.2025	0.3230	-0.1466	0.1120	1.0000	-0.1713	-0.0977	0.2194	-0.1914
APPLE--7	-0.0641	0.1044	0.0369	-0.1268	-0.0856	-0.1713	1.0000	-0.1909	0.1440	-0.2017
APPLE--8	0.0442	0.0526	-0.1220	0.1934	-0.2705	-0.0977	-0.1909	1.0000	0.2348	0.0991
APPLE--9	0.0673	-0.0618	-0.0286	-0.0232	-0.0288	0.2194	0.1440	0.2348	1.0000	-0.1405
APPLE-10	0.0365	-0.0280	-0.0393	-0.0170	-0.2060	-0.1914	-0.2017	0.0991	-0.1405	1.0000
APPLE-11	-0.1834	-0.0850	-0.0551	-0.1221	0.0513	-0.1237	0.2665	0.0162	0.0573	-0.1145
APPLE-12	-0.0650	-0.0333	-0.0033	-0.0136	0.2679	-0.1032	-0.0271	0.2084	-0.1694	-0.0068
APPLE-13	-0.0146	-0.0507	-0.1742	-0.1682	0.1019	-0.0655	-0.0638	-0.1038	-0.0681	0.6158
APPLE-14	-0.1717	-0.2247	-0.2395	0.0452	0.0598	-0.3061	0.1263	-0.1739	-0.1632	0.2649
APPLE-15	-0.0327	0.0298	0.2292	-0.1559	0.3224	0.5168	-0.0658	-0.2928	0.1296	-0.2993
APPLE-16	-0.1861	0.1380	0.0568	-0.0929	0.0879	0.1481	-0.1025	-0.0301	0.1123	-0.0496
APPLE-17	0.0438	-0.1968	-0.0593	-0.1551	-0.0090	0.0712	0.0908	0.0162	0.0132	-0.1631
APPLE-19	0.1110	-0.1714	-0.1252	0.1279	-0.1035	-0.3019	0.2143	0.2550	0.0809	0.2903
APPLE-20	0.0033	-0.0396	-0.1339	0.2920	-0.0820	0.1134	-0.0207	0.0901	0.1829	0.0556
APPLE-21	-0.0448	-0.0608	-0.0734	0.0172	-0.1133	-0.1526	0.0424	0.2308	0.3450	-0.1361
APPLE-22	0.0167	0.3475	0.1093	-0.3339	0.3941	0.1610	0.1849	-0.2436	0.0400	-0.2621
APPLE-23	0.0264	0.3434	0.2312	0.0615	-0.0618	0.4950	-0.0810	0.0287	-0.0043	-0.0498
APPLE-24	0.1840	0.1710	0.0724	0.0751	-0.0339	0.2541	0.1979	0.0501	0.0725	-0.1371
APPLE-25	-0.0539	0.0715	-0.0652	0.1264	-0.1614	-0.1873	0.1952	0.2367	-0.0626	-0.0898
APPLE-26	0.0947	-0.0329	0.2512	-0.1403	0.0353	0.3294	0.0588	-0.0815	0.2933	-0.1622
APPLE-27	-0.1425	-0.1202	-0.0197	-0.0921	0.1050	-0.0163	0.0275	0.1759	0.2301	-0.0722
APPLE-28	0.0662	-0.0861	0.3855	-0.0397	-0.2104	0.1785	0.3163	-0.0459	0.2578	-0.2590
APPLE-29	0.0436	-0.1263	0.2298	-0.0792	-0.0128	-0.0933	-0.0321	0.1142	0.0027	0.2507
APPLE-30	0.0210	-0.1832	-0.1323	0.1625	0.1478	-0.1183	0.0698	-0.0481	0.0276	0.0769

	APPLE--1	APPLE--2	APPLE--3	APPLE--4	APPLE--5	APPLE--6	APPLE--7	APPLE--8	APPLE--9	APPLE-10
APPLE-31	-0.0580	0.0268	-0.0330	0.0668	0.1881	0.2126	0.0693	-0.1430	0.0573	-0.0577
APPLE-32	-0.0373	0.5625	-0.0569	-0.0021	-0.0490	-0.1698	0.1784	0.3560	-0.1043	0.1644
APPLE-33	-0.0584	-0.1073	0.0903	0.0910	-0.1524	-0.2035	0.1193	0.3068	0.0561	0.1213
APPLE-34	-0.0605	0.1974	0.0990	-0.1062	0.1983	0.2218	-0.0513	-0.1013	0.3243	-0.1361
APPLE-35	-0.0684	-0.0421	0.0460	-0.1086	0.0044	0.2272	0.1318	-0.1069	0.1683	-0.1287
APPLE-36	0.0806	0.0357	0.0534	0.1396	0.0379	-0.1327	0.0687	-0.0698	0.0238	-0.1466
APPLE-37	0.1094	-0.1339	-0.0204	0.1031	0.0677	0.1148	-0.0465	0.1105	0.2106	0.0997
APPLE-38	0.1791	0.1062	0.0695	0.1640	0.0576	0.3118	-0.0290	-0.1665	-0.1231	-0.1566
APPLE-39	0.0915	-0.1090	0.0861	-0.1132	0.0821	0.1585	0.0186	0.0483	0.0807	-0.1041
APPLE-40	-0.1084	0.0952	0.0181	-0.1324	0.2154	0.0597	0.2121	-0.0329	0.1057	-0.0017
APPLE-41	-0.0536	-0.1868	-0.0111	0.2621	-0.2483	-0.2623	-0.1152	0.1017	-0.0599	0.0911
APPLE-42	-0.1928	0.1220	0.0389	-0.1491	0.1270	0.2633	0.1958	0.0623	0.2281	-0.1028
APPLE-43	-0.0742	0.3047	0.0161	-0.1274	-0.0269	0.0809	0.0173	0.1192	0.0112	0.0224
APPLE-44	-0.0363	0.0706	-0.0747	0.1100	0.0931	-0.1048	-0.0752	0.3207	-0.0015	-0.1133
APPLE-45	0.0977	0.0537	0.1562	0.4752	0.0596	0.0656	0.2863	0.1551	0.1477	0.1281
APPLE-46	0.3434	0.1101	0.2708	-0.0638	-0.0458	0.3489	0.0078	-0.1355	0.0774	-0.2405
APPLE-47	0.0160	-0.0430	0.0110	-0.0618	0.3468	0.1791	-0.0488	-0.1507	0.1140	-0.2605
APPLE-48	0.1322	0.0421	0.0656	-0.0954	-0.1137	0.1277	-0.0497	0.1038	0.1297	0.0143
APPLE-49	-0.1115	0.0690	-0.0635	-0.2211	-0.1517	-0.1339	-0.0378	0.0424	-0.0700	0.6601
APPLE-50	0.0206	0.1652	-0.1959	0.0111	0.2930	0.1399	0.1278	-0.1014	0.2826	-0.1528
CATCH-GN	0.1169	-0.1313	0.1145	0.0969	0.1017	0.1873	-0.1323	0.1598	-0.1345	-0.3646
CATCH-GN	-0.0998	-0.0006	-0.0137	-0.0554	-0.1815	-0.0268	0.0135	-0.1691	-0.1380	-0.3121
PTHAP-GN	0.0295	0.2361	0.0690	0.2061	-0.0126	0.1323	0.0255	0.0204	0.0260	-0.4555
TCTMA-GN	0.0296	0.1204	0.0654	0.1480	-0.0004	0.1585	-0.0293	0.0022	-0.0419	-0.5431

Grade 5 Math (continued)

	APPLE-11	APPLE-12	APPLE-13	APPLE-14	APPLE-15	APPLE-16	APPLE-17	APPLE-19	APPLE-20	APPLE-21
WD-----1	-0.0608	-0.0358	-0.0251	-0.0062	-0.0302	0.1586	-0.0529	-0.0610	0.3702	0.1022
WD-----2	-0.0309	-0.0971	0.0844	-0.0714	-0.0942	0.2637	-0.1100	0.0071	0.1857	0.0665
WD-----3	-0.0569	-0.1333	-0.0418	-0.2021	0.2084	0.1693	-0.0275	-0.0993	0.1244	-0.1625
WD-----4	0.1592	-0.1421	0.0451	0.0454	-0.0155	0.0834	0.0524	-0.1169	0.2018	-0.1347
WD-----5	0.1064	-0.0904	0.1214	0.0193	-0.0934	0.1786	0.0622	-0.0406	0.1299	-0.0009
WD-----6	-0.1541	-0.0000	-0.0851	-0.1767	0.0481	-0.0193	-0.0291	-0.0038	-0.0312	-0.0626
WD-----7	-0.1203	0.0270	-0.0673	-0.1768	0.1397	0.0376	0.1242	-0.1086	-0.0340	-0.0502
WD-----8	-0.0316	-0.0143	-0.1279	-0.1688	0.1939	0.3812	0.0757	0.0249	0.0419	-0.1704
WD-----9	-0.2229	0.1515	-0.0374	-0.2356	0.1945	0.3408	0.0680	0.1951	-0.0834	-0.3823
WD----10	0.0328	-0.1303	-0.0285	-0.1560	0.2902	0.4958	0.1021	0.0081	-0.0322	-0.1747
WD----11	-0.1651	0.2335	0.1636	0.0511	-0.0488	-0.1176	-0.0116	0.1604	-0.1606	-0.0912
WD----12	0.0247	0.1321	0.1525	0.2582	0.0338	-0.1013	0.0125	-0.0737	-0.0871	0.0746
WD----13	-0.2180	0.0501	0.1682	0.1492	0.0293	-0.1215	0.1159	0.1221	-0.0666	-0.1155
WD----14	-0.0618	-0.0532	-0.0417	-0.1385	0.1898	0.1996	0.2674	-0.0628	0.0017	-0.0762
WD----15	-0.1464	0.0298	-0.0561	-0.1491	0.1708	-0.0468	0.0611	-0.1238	0.0204	-0.0367
WD----16	-0.1113	0.0620	-0.0742	-0.1240	-0.0920	-0.0639	-0.0668	-0.1276	0.0030	-0.0005
WD----17	0.1236	0.0998	0.0488	0.0211	0.0710	0.0899	-0.1807	-0.0751	0.0335	-0.2361
WD----18	0.0530	0.0290	0.0816	0.0277	0.0075	-0.1386	-0.2302	-0.0744	0.0807	-0.2527
WD----19	-0.0488	0.0665	-0.1089	-0.0404	0.0534	0.0637	-0.0294	0.1777	-0.2345	-0.0187
WD----20	0.1449	0.0089	-0.1262	0.0837	0.0112	0.2276	-0.1369	-0.2044	0.2065	0.0576
WD----21	0.0681	-0.1791	0.2258	0.1007	0.0370	-0.1921	0.0867	-0.2837	0.2295	-0.1265
WD----22	0.0457	0.0198	-0.0159	-0.0653	0.0086	0.1407	0.1263	0.1404	0.1009	0.2680
WD----23	-0.2516	0.1422	-0.0919	-0.0266	-0.0796	-0.1963	-0.1619	0.1464	-0.2245	0.0405
WD----24	-0.0876	0.0298	-0.1271	-0.1564	0.0468	0.1260	0.1594	-0.0590	0.0239	-0.0367
WD----25	-0.1679	0.0624	-0.1057	-0.1490	0.0047	-0.0845	-0.0837	-0.1281	0.0837	-0.0242
WD----26	-0.0983	-0.0003	-0.0938	-0.1189	0.0104	-0.0688	-0.0159	-0.1156	-0.1426	0.0087
WD----27	-0.0570	-0.0061	-0.0784	-0.1373	0.2023	0.1492	0.2790	-0.1069	-0.0348	-0.0414
WD----28	-0.0433	0.0222	0.0537	0.1053	-0.3133	-0.1909	-0.2162	-0.0017	0.2390	0.1030
WD----29	-0.1219	-0.0259	0.1648	0.0269	-0.1298	-0.0505	-0.0468	-0.0022	-0.1898	-0.0724
WD----30	0.0436	0.0135	0.0945	0.1057	0.1442	-0.0154	0.1337	-0.0848	0.0490	-0.0913

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Grade 5 Math (continued)

	APPLE-11	APPLE-12	APPLE-13	APPLE-14	APPLE-15	APPLE-16	APPLE-17	APPLE-19	APPLE-20	APPLE-21
RAMOS--1	0.1109	0.1430	0.0366	-0.0686	0.0326	0.1736	0.0306	0.2145	-0.0633	-0.0202
RAMOS--2	0.1713	0.1712	-0.0880	-0.0518	0.1389	0.0457	-0.3476	-0.2233	-0.0631	-0.0180
RAMOS--3	-0.0364	0.0263	0.1180	-0.0325	-0.0768	0.1447	0.2911	0.4049	-0.0203	-0.0004
RAMOS--4	0.2504	0.0432	-0.0430	0.0199	-0.0923	-0.1219	-0.0081	0.1322	0.0510	-0.0618
RAMOS--5	0.0439	-0.1105	-0.0705	-0.1033	0.2353	0.4906	0.3756	-0.0057	-0.1066	-0.0468
RAMOS--6	-0.1042	-0.0571	-0.0155	-0.0015	-0.1071	-0.1064	-0.0601	0.0800	-0.0830	-0.0389
RAMOS--7	0.1219	0.2596	0.0930	0.0891	-0.0329	0.3068	0.2913	0.1808	0.0977	0.1239
RAMOS--8	0.0910	0.0177	-0.1171	-0.1998	0.0508	-0.1026	-0.1661	0.0536	-0.0057	-0.0843
RAMOS--9	0.1444	0.1166	0.0400	-0.0514	0.0400	0.2[illegible]0	0.2213	0.2257	0.1547	0.0806
RAMOS-10	-0.0586	0.3094	0.0291	-0.0595	0.1823	-0.0[illegible]4	-0.1835	-0.0281	-0.1632	-0.0522
RAMOS-11	-0.1592	-0.0154	0.1672	-0.0413	0.1040	0.3527	0.1707	0.1927	0.0395	0.1819
RAMOS-12	0.3823	0.1242	-0.1053	0.2504	0.0030	0.0330	-0.0411	-0.1435	0.1637	-0.1128
RAMOS-13	0.0565	-0.1232	-0.0908	-0.0010	0.0495	-0.0022	-0.0940	-0.1066	-0.0465	-0.0982
RAMOS-14	-0.0821	0.0710	0.0000	-0.0903	0.1463	0.1792	0.1197	-0.0550	-0.0283	-0.0844
RAMOS-15	0.1515	0.1416	0.0614	-0.0499	-0.0338	0.1839	0.2734	0.2797	0.1126	0.0938
RAMOS-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RAMOS-17	-0.0780	0.3130	-0.1240	-0.0906	0.2692	0.2760	-0.1554	-0.1637	-0.1071	-0.0940
RAMOS-18	-0.0900	-0.0638	0.0723	0.0959	-0.0689	-0.0870	-0.0992	0.0979	-0.1116	-0.0346
RAMOS-19	-0.1293	0.1286	-0.0185	-0.0543	0.1781	-0.1068	-0.1107	0.2071	-0.0763	-0.0234
RAMOS-20	-0.1147	0.0379	0.1319	-0.0264	-0.0502	-0.0012	-0.1404	-0.1323	0.2065	-0.0503

	APPLE-11	APPLE-12	APPLE-13	APPLE-14	APPLE-15	APPLE-16	APPLE-17	APPLE-19	APPLE-20	APPLE-21
APPLE--1	-0.1834	-0.0650	-0.0146	-0.1717	-0.0322	-0.1861	0.0438	0.1110	0.0033	-0.0448
APPLE--2	-0.0850	-0.0333	-0.0507	-0.2247	0.0298	0.1380	-0.1968	-0.1714	-0.0396	-0.0608
APPLE--3	-0.0551	-0.0033	-0.1742	-0.2395	0.2292	0.0568	-0.0593	-0.1252	-0.1337	-0.0734
APPLE--4	-0.1221	-0.0136	-0.1682	0.0452	-0.1559	-0.0929	-0.1551	0.1279	0.2920	0.0172
APPLE--5	0.0513	0.2679	0.1019	0.0598	0.3224	0.0879	-0.0090	-0.1035	-0.0820	-0.1133
APPLE--6	-0.1237	-0.1032	-0.0655	-0.3061	0.5168	0.1481	0.0712	-0.3019	0.1134	-0.1526
APPLE--7	0.2665	-0.0271	-0.0638	0.1263	-0.0658	-0.1025	0.0908	0.2143	-0.0207	0.0424
APPLE--8	0.0162	0.2084	-0.1038	-0.1739	-0.2928	-0.0301	0.0162	0.2550	0.0901	0.2308
APPLE--9	0.0573	-0.1694	-0.0681	-0.1632	0.1296	0.1123	0.0132	0.0809	0.1829	0.3450
APPLE-10	-0.1145	-0.0068	0.6158	0.2649	-0.2993	-0.0496	-0.1631	0.2903	0.0556	-0.1361
APPLE-11	1.0000	-0.1472	-0.0490	0.2772	0.0308	-0.0344	0.2848	-0.0351	0.1712	0.2143
APPLE-12	-0.1472	1.0000	-0.0930	-0.0316	-0.0355	-0.1143	-0.0508	0.1540	-0.0301	-0.0785
APPLE-13	-0.0490	-0.0930	1.0000	0.5267	-0.0812	-0.1651	-0.0376	0.2630	0.0262	-0.0024
APPLE-14	0.2772	-0.0316	0.5267	1.0000	-0.2801	-0.2903	-0.0876	0.0362	0.0598	0.2544
APPLE-15	0.0308	-0.0355	-0.0812	-0.2801	1.0000	0.4670	0.3497	-0.2670	0.1339	-0.1640
APPLE-16	-0.0344	-0.1143	-0.1651	-0.2903	0.4670	1.0000	0.3120	-0.0445	-0.0013	-0.1402
APPLE-17	0.2848	-0.0508	-0.0376	-0.0876	0.3497	0.3120	1.0000	0.2503	-0.1321	-0.1358
APPLE-19	-0.0351	0.1540	0.2630	0.0362	-0.2670	-0.0445	0.2503	1.0000	-0.4633	-0.1568
APPLE-20	0.1712	-0.0301	0.0262	0.0598	0.1339	-0.0013	-0.1321	-0.4633	1.0000	0.1636
APPLE-21	0.2143	-0.0785	-0.0024	0.2544	-0.1640	-0.1402	-0.1358	-0.1568	0.1636	1.0000
APPLE-22	0.1846	0.1013	-0.0461	0.0876	0.2360	-0.0141	-0.0055	-0.0161	-0.4169	0.0881
APPLE-23	-0.1473	-0.0492	-0.1186	-0.2633	0.2813	0.2770	-0.1779	-0.4675	0.4461	-0.1363
APPLE-24	-0.2325	0.0662	-0.1372	-0.1432	-0.0796	-0.0317	-0.1946	0.0252	0.1005	0.0161
APPLE-25	-0.1059	0.1136	-0.0594	-0.0982	-0.2267	-0.0960	-0.0211	0.3314	-0.1262	0.1792
APPLE-26	0.0211	0.0747	-0.1107	-0.2188	0.4229	0.2973	0.0227	-0.0844	-0.0548	-0.1299
APPLE-27	0.0784	-0.0525	-0.0005	-0.0278	0.1351	-0.0554	0.3006	0.2446	-0.1419	0.0453
APPLE-28	0.2732	-0.1788	-0.0310	-0.1371	0.1768	-0.0775	0.1448	0.1296	-0.0787	-0.0764
APPLE-29	-0.1080	-0.0660	-0.1428	-0.1837	-0.0237	0.2107	0.1255	0.1170	-0.0854	-0.1023
APPLE-30	0.0505	0.2146	-0.0309	0.1829	-0.0298	-0.1835	0.0387	0.1584	-0.1066	0.0776

Grade 5 Math (continued)

	APPLE-11	APPLE-12	APPLE-13	APPLE-14	APPLE-15	APPLE-16	APPLE-17	APPLE-19	APPLE-20	APPLE-21
APPLE-31	0.0568	-0.0439	0.1071	-0.0108	-0.0403	-0.0273	-0.0340	-0.1650	0.2345	-0.0848
APPLE-32	0.1219	0.1422	-0.0803	-0.0848	-0.1365	0.0887	-0.1364	-0.0140	0.0780	-0.0614
APPLE-33	0.2354	0.0429	-0.0637	-0.0531	-0.1516	-0.1311	0.1880	0.1636	0.1480	0.1902
APPLE-34	0.0373	-0.0916	-0.0855	-0.1142	0.2100	0.1181	-0.0662	-0.0390	-0.1143	-0.0133
APPLE-35	0.0344	-0.0878	-0.0956	-0.1112	0.3188	0.3307	0.0458	-0.0833	-0.0605	-0.0463
APPLE-36	0.0312	0.0579	-0.1195	0.1020	-0.0513	-0.0995	-0.1802	0.0210	0.1156	0.0798
APPLE-37	-0.0620	0.0317	0.0489	-0.1057	0.0497	0.1428	0.0688	0.2296	-0.1563	-0.0777
APPLE-38	-0.0201	0.1443	-0.1037	-0.1180	0.3869	0.0931	0.0015	-0.3902	0.5424	-0.0271
APPLE-39	-0.0025	0.0796	-0.0225	-0.1569	0.2170	0.0023	0.4048	0.2469	-0.0951	-0.0909
APPLE-40	0.0724	0.1329	-0.0579	0.0348	0.1303	0.1496	0.1340	-0.0568	0.0240	-0.1141
APPLE-41	-0.0500	0.0024	-0.1173	0.1089	-0.0969	-0.0402	0.0614	0.0582	0.0262	-0.1081
APPLE-42	-0.1323	0.1485	-0.0167	-0.1111	0.2237	0.2257	0.0262	-0.1550	0.1149	-0.0200
APPLE-43	-0.0218	0.0147	-0.0899	-0.1869	0.2736	0.4912	0.0570	-0.1011	-0.0250	-0.0813
APPLE-44	-0.0478	-0.0010	-0.1687	-0.0571	-0.0190	0.3056	0.0072	0.0263	0.1348	-0.0494
APPLE-45	0.1768	0.0478	0.0303	0.2485	0.0847	-0.0848	-0.0016	0.1246	0.2958	0.1367
APPLE-46	-0.0762	-0.0557	-0.2066	-0.1537	0.3875	0.3203	-0.0739	-0.2145	0.0286	0.0430
APPLE-47	0.0216	0.4325	-0.1452	-0.1091	0.3499	0.1156	0.0347	-0.0326	-0.0919	-0.1031
APPLE-48	0.0071	-0.0138	0.0107	-0.1500	0.0775	-0.0455	0.1271	0.1089	-0.1532	-0.0780
APPLE-49	-0.1689	-0.0646	0.7407	0.3992	-0.0757	0.0876	-0.1198	0.1150	0.1067	-0.0609
APPLE-50	0.0594	-0.0520	0.0679	-0.0149	-0.0177	-0.1262	0.2023	0.1257	0.0508	-0.0402
CATCH-GN	-0.1678	0.3347	-0.2944	-0.0784	-0.0733	-0.2752	-0.1020	-0.0594	-0.2615	-0.0080
CATCH-GN	0.0467	-0.0550	-0.4354	-0.1908	-0.0360	-0.2204	0.1409	-0.2589	-0.0284	0.0280
MTHAP-GN	-0.0226	-0.0156	-0.6314	-0.3913	0.0695	0.1427	-0.1567	-0.2104	-0.0793	-0.1128
TOTMA-GN	-0.0575	0.0727	-0.6645	-0.3436	0.0381	-0.0631	-0.0599	-0.2546	-0.1458	-0.0459

	APPLE-22	APPLE-23	APPLE-24	APPLE-25	APPLE-26	APPLE-27	APPLE-28	APPLE-29	APPLE-30	APPLE-31
WC-----1	-0.1431	-0.1645	0.1439	0.0220	0.1238	-0.0930	-0.1545	0.0710	0.0950	0.0863
WC-----2	-0.1974	0.1834	0.0817	0.0849	-0.0264	-0.2506	-0.1694	-0.0575	-0.0551	0.0804
WC-----3	-0.0182	0.0814	-0.2324	-0.0357	0.0549	-0.2662	0.1749	-0.1250	-0.0178	-0.1471
WC-----4	-0.1552	0.1147	-0.2106	-0.1015	-0.1314	-0.0550	-0.0392	-0.1511	0.1068	0.1067
WC-----5	-0.0533	0.3312	-0.0100	-0.0143	0.0510	-0.0752	-0.0389	-0.0175	0.0697	0.2936
WC-----6	-0.1743	-0.0483	-0.0362	-0.0953	-0.0529	0.2153	-0.1519	0.0603	-0.1835	-0.1037
WC-----7	-0.1539	-0.0874	0.0813	-0.1286	-0.0866	0.2543	-0.1387	-0.0023	-0.1542	-0.1400
WC-----8	0.0895	-0.1032	-0.1527	-0.2117	0.2305	-0.0611	-0.0149	-0.0422	0.0196	0.0060
WC-----9	-0.0995	0.0103	-0.0858	-0.1678	0.0030	0.0025	-0.0485	0.0351	-0.0454	-0.0886
WC----10	0.1525	-0.0185	-0.0677	-0.1503	0.2565	-0.1249	-0.0055	0.0184	0.0221	-0.0127
WC----11	0.1189	0.0553	-0.0252	0.0475	-0.0509	-0.1618	0.1605	0.0705	0.4022	-0.1355
WC----12	0.2384	0.0090	-0.0826	-0.1527	-0.0052	0.0137	0.1768	-0.0973	0.2852	0.0224
WC----13	-0.0707	0.0097	0.0375	-0.0496	-0.1139	0.2356	-0.0187	-0.0116	0.2512	-0.1249
WC----14	-0.2263	-0.1593	-0.0423	-0.1245	-0.1619	0.3556	-0.1984	-0.0594	-0.1079	-0.1355
WC----15	-0.1291	-0.1120	0.1187	-0.1330	-0.1177	0.3382	-0.1175	0.0389	-0.0006	-0.1448
WC----16	-0.0965	-0.0870	0.1936	-0.0947	-0.0964	0.0987	-0.0415	-0.0177	-0.0170	-0.1031
WC----17	0.2273	-0.0357	0.0532	-0.2623	0.1063	-0.2015	-0.0148	0.0930	0.1018	0.0210
WC----18	0.0379	-0.0625	0.0358	-0.2342	-0.1609	-0.1389	-0.0898	0.0609	-0.0752	0.0570
WC----19	0.3736	-0.1168	-0.1148	-0.1231	0.1228	0.0316	0.2817	0.1696	0.2125	-0.1701
WC----20	0.0748	0.2997	0.0980	-0.1196	-0.0131	-0.0421	-0.1731	0.0352	-0.0508	0.0611
WC----21	-0.2433	0.0350	-0.1992	-0.1511	-0.0342	-0.0759	-0.0352	-0.1417	-0.0221	0.3237
WC----22	-0.1061	-0.1948	-0.0966	0.0790	0.1127	0.0548	-0.0964	-0.0923	0.1040	-0.0316
WC----23	0.1497	-0.1191	0.4347	0.3067	-0.0687	-0.0123	-0.0181	0.1773	-0.1696	-0.0853
WC----24	-0.1826	-0.1120	0.1187	-0.1330	-0.1177	0.1089	-0.1175	-0.0140	-0.0006	-0.1448
WC----25	-0.1427	-0.0773	0.1684	-0.1225	-0.0865	0.1461	-0.0923	0.0080	0.0447	-0.1334
WC----26	-0.0360	-0.0625	0.1844	-0.0918	-0.0929	0.1255	-0.0251	0.0038	0.0078	-0.0999
WC----27	-0.1460	-0.1249	0.0950	-0.1350	-0.1289	0.2249	-0.1261	-0.0394	-0.0202	-0.1470
WC----28	-0.0855	0.1820	0.0810	-0.0445	-0.0846	-0.2242	0.1941	0.0052	0.1841	0.2016
WC----29	-0.0776	-0.2052	-0.0999	-0.0267	-0.0718	-0.0441	-0.1038	-0.0964	-0.1189	-0.1176
WC----30	0.0944	-0.1155	0.0876	0.0299	-0.0561	0.0439	-0.0070	-0.2309	-0.0252	-0.1751

Grade 5 Math (continued)

	APPLE-22	APPLE-23	APPLE-24	APPLE-25	APPLE-26	APPLE-27	APPLE-28	APPLE-29	APPLE-30	APPLE-31
RAMOS--1	0.0372	0.0397	-0.2560	-0.1825	-0.0647	-0.0245	0.2048	-0.0258	0.2250	0.1288
RAMOS--2	0.3530	0.2875	-0.1582	-0.2246	0.1003	-0.1676	0.0992	-0.2787	0.2366	0.0083
RAMOS--3	-0.2299	-0.1821	-0.1688	-0.0149	-0.1582	0.0826	0.1222	0.2106	0.0649	0.1311
RAMOS--4	-0.0298	-0.0464	-0.0242	-0.0830	0.1011	0.1894	0.3469	-0.1709	0.0584	0.4110
RAMOS--5	-0.0970	0.0681	0.1900	-0.0847	-0.0548	0.1035	-0.0616	-0.0714	-0.1114	-0.0188
RAMOS--6	0.0607	-0.0322	0.1754	-0.1084	-0.0585	0.0891	0.1862	-0.0468	0.3279	0.0620
RAMOS--7	-0.1534	-0.0875	-0.2199	-0.0815	-0.0694	-0.0196	-0.2557	0.1666	0.2025	0.1321
RAMOS--8	0.0746	0.1839	0.0486	-0.0990	0.1091	0.0988	0.5125	-0.1591	-0.1938	0.0925
RAMOS--9	-0.2061	0.1139	-0.2179	-0.1099	-0.0905	0.0813	0.1724	0.1029	0.0712	0.1818
RAMOS-10	0.3793	0.0818	0.0838	-0.1980	-0.0502	-0.0673	0.1109	-0.1817	0.2819	0.1727
RAMOS-11	-0.1899	0.1710	-0.0073	0.0314	-0.0612	-0.0880	0.0433	0.0936	0.0279	0.2377
RAMOS-12	0.1641	0.0413	0.0650	-0.1689	-0.0284	-0.0235	-0.0814	0.0814	0.1824	-0.0057
RAMOS-13	0.1706	0.0786	-0.0264	-0.1388	0.1320	-0.0559	-0.0513	-0.1686	-0.1557	0.0466
RAMOS-14	0.2453	-0.0238	0.1401	-0.1375	0.0229	-0.0192	-0.0041	0.1701	0.2469	0.1212
RAMOS-15	-0.2871	0.0341	-0.2780	-0.0410	-0.1227	0.0796	0.1251	0.0880	0.1012	0.1184
RAMOS-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RAMOS-17	0.4529	0.1884	0.0232	-0.2214	0.3061	-0.0534	0.1108	-0.0555	0.1758	0.0138
RAMOS-18	0.1095	-0.0894	0.0390	-0.0489	-0.0245	-0.0607	0.1626	-0.0820	0.3580	0.1276
RAMOS-19	-0.0148	-0.0757	0.0647	0.0316	-0.1371	0.0117	0.2255	-0.1581	0.0282	-0.0805
RAMOS-20	-0.1849	0.3936	0.1010	-0.0862	-0.1326	-0.1069	-0.1073	-0.1051	-0.1395	0.5659

	APPLE-22	APPLE-23	APPLE-24	APPLE-25	APPLE-26	APPLE-27	APPLE-28	APPLE-29	APPLE-30	APPLE-31
APPLE--1	0.0162	0.0264	0.1840	-0.0539	0.0942	-0.1425	0.0662	0.0436	0.0210	-0.0586
APPLE--2	0.3475	0.3434	0.1710	0.0715	-0.0329	-0.1202	-0.0861	-0.1263	-0.1832	0.0268
APPLE--3	0.1093	0.2312	0.0724	-0.0652	0.2512	-0.0197	0.3855	0.2298	-0.1323	-0.0330
APPLE--4	-0.3339	0.0615	0.0751	0.1264	-0.1403	-0.0921	-0.0397	-0.0792	0.1625	0.0668
APPLE--5	0.3941	-0.0618	-0.0339	-0.1614	0.0353	0.1050	-0.2104	-0.0128	0.1478	0.1881
APPLE--6	0.1610	0.4950	0.2541	-0.1873	0.3294	-0.0163	0.1785	-0.0933	-0.1183	0.2126
APPLE--7	0.1849	-0.0810	0.1979	0.1952	0.0588	0.0275	0.3163	-0.0321	0.0698	0.0693
APPLE--8	-0.2436	0.0287	0.0501	0.2367	-0.0815	0.1759	-0.0459	0.1142	-0.0481	-0.1430
APPLE--9	0.0400	-0.0043	0.0725	-0.0626	0.2933	0.2301	0.2578	0.0027	0.0276	0.0573
APPLE-10	-0.2621	-0.0498	-0.1371	-0.0898	-0.1622	-0.0722	-0.2590	0.2507	0.0769	-0.0577
APPLE-11	0.1846	-0.1473	-0.2325	-0.1059	0.0211	0.0784	0.2732	-0.1080	0.0505	0.0368
APPLE-12	0.1013	-0.0492	0.0662	0.1136	0.0747	-0.0525	-0.1788	-0.0600	0.2146	-0.0439
APPLE-13	-0.0461	-0.1186	-0.1372	-0.0594	-0.1107	-0.0005	-0.0310	-0.1428	-0.0309	0.1071
APPLE-14	0.0876	-0.2633	-0.1432	-0.0982	-0.2188	-0.0278	-0.1371	-0.1837	0.1829	-0.0108
APPLE-15	0.2360	0.2813	-0.0796	-0.2267	0.4229	0.1351	0.1768	-0.0237	-0.0298	-0.0403
APPLE-16	-0.0141	0.2770	-0.0317	-0.0960	0.2973	-0.0554	-0.0775	0.2107	-0.1835	-0.0273
APPLE-17	-0.0055	-0.1779	-0.1946	-0.0211	0.0227	0.3006	0.1448	0.1255	0.0387	-0.0340
APPLE-19	-0.0161	-0.4675	0.0252	0.3314	-0.0844	0.2446	0.1296	0.1170	0.1584	-0.1650
APPLE-20	-0.4167	0.4467	0.1005	-0.1262	-0.0548	-0.1419	-0.0787	-0.0854	-0.1066	0.2345
APPLE-21	0.0881	-0.1363	0.0161	0.1792	-0.1299	0.0453	-0.0764	-0.1023	0.0776	-0.0948
APPLE-22	1.0000	-0.2938	-0.0041	-0.0525	0.4404	-0.1100	0.0896	-0.0374	0.2933	-0.0435
APPLE-23	-0.2938	1.0000	0.1199	-0.1234	0.0524	-0.1773	0.1145	-0.1745	-0.2617	0.2557
APPLE-24	-0.0041	0.1199	1.0000	0.4871	-0.0070	-0.0802	-0.1287	0.0242	-0.1022	0.0846
APPLE-25	-0.0525	-0.1234	0.4871	1.0000	-0.1616	-0.0031	-0.0717	-0.0438	-0.0875	-0.1161
APPLE-26	0.4404	0.0524	-0.0070	-0.1616	1.0000	-0.1082	0.2644	0.0663	0.0464	0.1077
APPLE-27	-0.1100	-0.1773	-0.0802	-0.0031	-0.1082	1.0000	0.0209	0.0417	-0.1129	-0.1397
APPLE-28	0.0896	0.1145	-0.1287	-0.0717	0.2644	0.0209	1.0000	-0.0781	0.0145	0.1632
APPLE-29	-0.0374	-0.1745	0.0242	-0.0438	0.0663	0.0417	-0.0781	1.0000	0.0099	-0.0540
APPLE-30	0.2933	-0.2617	-0.1022	-0.0875	0.0464	-0.1129	0.0145	0.0099	1.0000	-0.0300

Grade 5 Math (continued)

	APPLE-22	APPLE-23	APPLE-24	APPLE-25	APPLE-26	APPLE-27	APPLE-28	APPLE-29	APPLE-30	APPLE-31
APPLE-31	-0.0435	0.2557	0.0846	-0.1161	0.1077	-0.1397	0.1632	-0.0540	-0.0300	1.0000
APPLE-32	-0.0577	0.2596	-0.1163	-0.0946	-0.1147	-0.1251	-0.0375	-0.0364	-0.0251	-0.0805
APPLE-33	-0.1774	-0.1976	-0.1491	0.0909	-0.2376	0.0652	0.0265	0.2285	-0.0787	0.1357
APPLE-34	0.3423	-0.0069	-0.0977	-0.0737	0.1079	0.0200	0.0638	-0.0912	-0.0298	-0.0369
APPLE-35	0.1214	0.1633	-0.1148	-0.0653	0.4323	-0.0808	0.2764	0.0031	-0.0555	0.0863
APPLE-36	0.0912	-0.0680	0.1968	0.1438	-0.1371	-0.1345	0.0297	-0.0415	-0.1569	-0.1047
APPLE-37	0.0376	-0.1053	-0.0876	-0.0341	0.3392	0.1349	-0.0527	-0.0690	0.1875	-0.0282
APPLE-38	-0.0860	0.5363	0.2172	-0.0716	-0.0152	-0.2352	0.0150	-0.2756	-0.0411	-0.0014
APPLE-39	-0.0364	0.0372	-0.0511	0.1180	-0.0744	0.1598	0.2552	0.2458	0.1427	-0.0511
APPLE-40	0.0924	0.2066	-0.1163	-0.1143	-0.0607	0.0666	0.0438	0.0401	0.3921	0.0289
APPLE-41	-0.1835	-0.0682	0.0297	0.0170	-0.0254	0.1077	-0.0193	0.2280	0.0309	-0.0520
APPLE-42	0.0763	0.3410	0.0044	-0.0907	0.2949	-0.0245	0.0814	-0.0371	0.1185	0.3767
APPLE-43	0.0939	0.2648	-0.1849	-0.0314	0.3633	-0.0339	0.0292	0.0666	-0.0396	-0.0711
APPLE-44	-0.0079	0.0060	0.1834	0.0408	0.1131	-0.1444	-0.0743	0.3904	-0.0450	-0.0920
APPLE-45	0.0421	0.0574	0.1742	0.1172	0.0428	0.2110	0.0829	0.0852	0.1539	0.1013
APPLE-46	0.3794	0.2726	0.1707	-0.1473	0.4774	-0.2859	0.2250	0.1973	-0.0623	-0.0472
APPLE-47	0.3774	-0.0187	-0.1103	-0.1108	0.3139	-0.0528	0.1759	-0.0548	0.2264	-0.0299
APPLE-48	0.2660	-0.1914	0.0512	0.0072	0.3021	0.2707	0.2143	0.2548	0.0218	0.0741
APPLE-49	-0.1735	0.1682	-0.0996	-0.0977	-0.0302	-0.1237	-0.0964	-0.0259	-0.1302	-0.0541
APPLE-50	0.1576	-0.0722	-0.0504	-0.1055	-0.1439	-0.0450	0.0255	-0.1796	0.0204	0.2619
CATCH-ON	0.1205	0.0430	0.1090	0.1425	0.0108	-0.0434	-0.0156	-0.0991	0.1133	-0.0131
CATCH-CN	0.0140	0.0444	-0.0065	-0.0199	-0.1235	0.0534	0.0328	-0.1015	0.1463	0.1033
MTHAP-CN	0.1890	0.2057	0.2219	-0.1342	0.2273	-0.1086	0.2175	-0.0201	0.0700	0.1052
TOTMA-CN	0.1828	0.1555	0.1645	-0.0581	0.0711	-0.0559	0.1311	-0.0827	0.1498	0.1011

	APPLE-32	APPLE-33	APPLE-34	APPLE-35	APPLE-36	APPLE-37	APPLE-38	APPLE-39	APPLE-40	APPLE-41
WD-----1	-0.2079	-0.1216	-0.0889	-0.0438	0.0859	0.1416	0.1575	-0.1445	0.0413	0.0353
WD-----2	0.0634	-0.1749	-0.0085	0.0242	-0.0288	0.0741	0.2313	0.0863	-0.0022	-0.2403
WD-----3	0.1371	-0.0258	-0.0476	0.2663	0.2979	0.0300	0.2668	0.0144	0.0707	-0.2121
WD-----4	-0.0628	-0.0886	0.1154	-0.0614	-0.0981	0.0221	0.1413	0.1780	0.1678	-0.1840
WD-----5	0.3124	-0.2338	0.0139	-0.0669	-0.2199	0.1668	0.0582	-0.0872	0.2257	-0.1707
WD-----6	-0.1087	-0.0052	-0.0489	-0.0566	-0.0965	-0.0787	-0.0978	-0.0510	-0.1558	-0.0729
WD-----7	-0.1083	-0.0937	-0.0702	-0.0764	-0.1302	0.0833	-0.0026	-0.0963	-0.2103	-0.1111
WD-----8	-0.0051	-0.1041	0.0787	0.0323	0.0677	0.2585	0.1356	-0.1117	-0.0942	-0.0824
WD-----9	0.1493	0.0520	-0.0043	-0.0491	-0.0390	-0.0107	0.1290	-0.0173	-0.1753	0.0465
WD----10	0.0662	-0.0825	0.2921	0.1768	-0.1661	0.0882	0.1220	-0.1304	0.0041	-0.2410
WD----11	0.0476	-0.1318	-0.0530	-0.1439	-0.0997	-0.0907	0.1065	0.1578	0.1712	0.2845
WD----12	-0.1635	0.0013	0.0043	-0.1370	-0.1240	-0.0088	0.0669	-0.0331	0.0967	0.1821
WD----13	0.0834	0.0555	-0.0515	-0.1355	-0.1850	0.0130	-0.1959	0.0296	0.3472	0.1030
WD----14	-0.1482	-0.0825	-0.0972	-0.0739	-0.1261	0.1130	0.0545	-0.0773	-0.2036	-0.1254
WD----15	-0.1000	-0.0770	-0.0675	-0.0790	-0.1347	0.1011	0.0071	-0.1028	-0.2176	-0.0442
WD----16	-0.0476	-0.0835	-0.0563	-0.0563	-0.0960	-0.0170	0.0274	-0.1063	-0.1550	-0.0472
WD----17	0.0712	-0.1499	-0.0158	-0.2185	0.0858	-0.1167	0.2494	-0.0793	-0.0022	0.0284
WD----18	0.0343	0.0987	0.1881	-0.4337	0.1428	-0.0831	0.2108	-0.1672	-0.1255	-0.0673
WD----19	-0.1160	0.1447	0.1879	0.1455	0.0828	-0.0485	0.0793	0.1629	0.0042	0.0209
WD----20	0.2982	-0.0766	0.0301	-0.0808	-0.0666	-0.1098	0.0764	-0.1410	0.4804	0.0619
WD----21	-0.1587	0.0155	-0.1762	-0.0808	-0.1546	-0.0663	-0.0864	-0.0142	-0.2110	-0.0339
WD----22	-0.0689	-0.0075	-0.0562	-0.0552	0.1329	0.3084	0.0438	-0.0313	-0.1753	-0.0474
WD----23	-0.1334	-0.0378	-0.1532	-0.0976	0.0712	-0.1016	0.0599	0.1814	-0.1836	0.1438
WD----24	-0.0921	-0.0949	-0.0820	-0.0790	-0.1347	-0.0666	0.1165	-0.0712	-0.2176	0.0062
WD----25	-0.0809	-0.0840	-0.0623	-0.0728	-0.1241	-0.0499	0.0730	-0.1195	-0.2004	-0.0001
WD----26	-0.0293	-0.0582	-0.0099	-0.0545	-0.0929	-0.0845	-0.0805	-0.0656	-0.1501	-0.0029
WD----27	-0.0989	-0.1196	-0.0753	-0.0802	-0.1368	0.0855	0.0841	-0.0780	-0.2209	-0.0452
WD----28	0.1045	0.0243	-0.3190	-0.2110	0.1849	-0.0625	0.2264	0.0500	0.2146	0.1108
WD----29	-0.0938	-0.1116	0.0294	0.0636	-0.1037	-0.0445	-0.2299	-0.1579	-0.1403	-0.1513
WD----30	-0.1434	-0.1243	0.1174	-0.1001	0.0243	-0.1911	0.1567	-0.1932	0.1603	-0.0114

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Grade 5 Math (continued)

	APPLE-32	APPLE-33	APPLE-34	APPLE-35	APPLE-36	APPLE-37	APPLE-38	APPLE-39	APPLE-40	APPLE-41
RAMOS--1	0.2660	0.1993	0.1879	0.1023	-0.1802	-0.0693	-0.1938	0.1639	0.4341	0.0270
RAMOS--2	0.3338	-0.2562	0.3086	0.0801	-0.2298	-0.1557	0.1166	-0.1009	0.3159	-0.0678
RAMOS--3	0.0431	0.4044	-0.0363	0.0433	-0.0078	0.0477	-0.2991	0.2475	0.2326	0.0573
RAMOS--4	-0.0666	0.2595	0.0362	0.1140	-0.1080	0.0197	-0.1924	0.1347	0.0621	0.3377
RAMOS--5	-0.0662	-0.0475	-0.0154	-0.0502	-0.0473	-0.0785	0.1503	0.0685	-0.0438	-0.0835
RAMOS--6	0.0593	-0.0522	-0.0652	-0.0684	-0.1169	0.0973	-0.1133	0.1624	0.1761	0.0640
RAMOS--7	0.1038	0.3035	-0.1870	0.0172	-0.1408	0.0419	-0.1036	0.0054	0.2594	-0.1004
RAMOS--8	0.0852	-0.0587	0.0685	0.0637	0.3017	-0.1427	0.1421	0.0277	-0.0603	0.2560
RAMOS--9	0.2659	0.3079	-0.0653	0.0497	-0.0594	-0.0258	-0.0707	0.1357	0.4024	0.0241
RAMOS-10	0.0206	-0.1596	0.1650	-0.0988	0.1975	-0.0865	0.1857	0.1395	0.1862	0.0062
RAMOS-11	0.0638	0.2011	-0.1285	0.1605	0.0240	0.0649	0.0170	0.1576	0.2133	-0.0288
RAMOS-12	0.3013	-0.1280	0.1631	-0.0945	0.0900	-0.0657	0.0347	-0.1502	0.5407	-0.0396
RAMOS-13	0.0800	0.1476	0.4111	-0.0823	-0.0313	-0.1407	-0.0989	-0.1091	-0.0807	0.1098
RAMOS-14	0.1077	-0.1215	-0.0682	-0.0945	-0.1278	0.0048	0.0504	0.3867	0.4154	-0.0846
RAMOS-15	0.1628	0.3960	-0.0338	0.0140	-0.1823	-0.0280	-0.0971	0.1142	0.2807	0.1385
RAMOS-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RAMOS-17	0.1276	-0.2303	0.1798	0.3170	0.0814	-0.0102	0.1115	0.0808	0.2448	-0.1622
RAMOS-18	-0.0593	-0.0997	-0.0562	-0.0290	-0.0496	0.1766	-0.1164	0.1521	0.2462	-0.0011
RAMOS-19	0.0284	-0.0448	-0.1066	-0.0682	0.6269	-0.0347	0.1487	0.0745	0.0193	-0.0468
RAMOS-20	-0.0505	-0.1450	-0.0961	-0.0511	0.1883	-0.0874	0.3193	-0.1502	-0.1379	0.0815

	APPLE-32	APPLE-33	APPLE-34	APPLE-35	APPLE-36	APPLE-37	APPLE-38	APPLE-39	APPLE-40	APPLE-41
APPLE--1	-0.0373	-0.0584	-0.0605	-0.0684	0.0806	0.1094	0.1791	0.0915	-0.1084	-0.0536
APPLE--2	0.5625	-0.1073	0.1974	-0.0421	0.0352	-0.1339	0.1062	-0.1090	0.0952	-0.1868
APPLE--3	-0.0569	0.0903	0.0990	0.0460	0.0534	-0.0204	0.0695	0.0861	0.0181	-0.0111
APPLE--4	-0.0021	0.0910	-0.1062	-0.1086	0.1396	0.1031	0.1640	-0.1132	-0.1324	0.2621
APPLE--5	-0.0490	-0.1524	0.1983	0.0044	0.0379	0.0677	0.0576	0.0821	0.2154	-0.2483
APPLE--6	-0.1698	-0.2035	0.2218	0.2272	-0.1327	0.1148	0.3118	0.1585	0.0597	-0.2623
APPLE--7	0.1784	0.1193	-0.0513	0.1318	0.0687	-0.0465	-0.0290	0.0186	0.2121	-0.1152
APPLE--8	0.3560	0.3068	-0.1013	-0.1069	-0.0698	0.1105	-0.1665	0.0483	-0.0329	0.1017
APPLE--9	-0.1043	0.0561	0.3243	0.1683	0.0238	0.2106	-0.1231	0.0807	0.1057	-0.0599
APPLE-10	0.1644	0.1213	-0.1361	-0.1287	-0.1466	0.0997	-0.1566	-0.1041	-0.0017	0.0911
APPLE-11	0.1219	0.2354	0.0373	0.0344	0.0312	-0.0620	-0.0201	-0.0025	0.0724	-0.0500
APPLE-12	0.1422	0.0429	-0.0916	-0.0878	0.0579	0.0317	0.1443	0.0796	0.1329	0.0024
APPLE-13	-0.0803	-0.0637	-0.0855	-0.0956	-0.1195	0.0489	-0.1037	-0.0225	-0.0579	-0.1173
APPLE-14	-0.0848	-0.0531	-0.1142	-0.1112	0.1020	-0.1057	-0.1180	-0.1569	0.0348	0.1089
APPLE-15	-0.1365	-0.1516	0.2100	0.3188	-0.0513	0.0497	0.3869	0.2170	0.1303	-0.0969
APPLE-16	0.0887	-0.1311	0.1181	0.3307	-0.0995	0.1428	0.0931	0.0023	0.1496	-0.0402
APPLE-17	-0.1364	0.1880	-0.0662	0.0458	-0.1802	0.0688	0.0015	0.4048	0.1340	0.0614
APPLE-19	-0.0140	0.1636	-0.0390	-0.0833	0.0210	0.2296	-0.3902	0.2469	-0.0568	0.0582
APPLE-20	0.0780	0.1480	-0.1143	-0.0605	0.1156	-0.1563	0.5424	-0.0951	0.0240	0.0262
APPLE-21	-0.0614	0.1902	-0.0133	-0.0463	0.0798	-0.0777	-0.0271	-0.0909	-0.1141	-0.1081
APPLE-22	-0.0577	-0.1774	0.3423	0.1214	0.0912	0.0376	-0.0860	-0.0364	0.0924	-0.1835
APPLE-23	0.2996	-0.1976	-0.0069	0.1633	-0.0680	-0.1053	0.5363	0.0372	0.2066	-0.0682
APPLE-24	-0.1163	-0.1491	-0.0977	-0.1148	0.1968	-0.0876	0.2172	-0.0511	-0.1163	0.0297
APPLE-25	-0.0946	0.0909	-0.0737	-0.0653	0.1438	-0.0341	-0.0716	0.1180	-0.1143	0.0170
APPLE-26	-0.1147	-0.2376	0.1079	0.4323	-0.1371	0.3392	-0.0152	-0.0744	-0.0607	-0.0254
APPLE-27	-0.1251	0.0652	0.0200	-0.0808	-0.1345	0.1349	-0.2352	0.1598	0.0666	0.1077
APPLE-28	-0.0375	0.0265	0.0638	0.2764	0.0297	-0.0527	0.0150	0.2552	0.0438	-0.0193
APPLE-29	-0.0364	0.2285	-0.0912	0.0031	-0.0415	-0.0690	-0.2756	0.2458	0.0401	0.2280
APPLE-30	-0.0251	-0.0787	-0.0298	-0.0555	-0.1569	0.1875	-0.0411	0.1427	0.3921	0.0309

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Grade 5 Math (continued)

	APPLE-32	APPLE-33	APPLE-34	APPLE-35	APPLE-36	APPLE-37	APPLE-38	APPLE-39	APPLE-40	APPLE-41
APPLE-31	-0.0805	0.1357	-0.0369	0.0863	-0.1047	-0.0282	-0.0014	-0.0511	0.0289	-0.0520
APPLE-32	1.0000	0.0216	-0.0428	-0.0455	-0.0176	-0.0470	-0.0699	-0.1751	0.2899	-0.1644
APPLE-33	0.0216	1.0000	0.1235	-0.1358	-0.0698	-0.1486	-0.2303	0.1142	-0.2067	0.0682
APPLE-34	-0.0428	0.1235	1.0000	-0.0211	-0.1262	-0.0750	-0.1319	-0.1076	0.0329	-0.1051
APPLE-35	-0.0455	-0.1358	-0.0211	1.0000	-0.0661	0.1420	-0.0494	0.0732	-0.0314	-0.1406
APPLE-36	-0.0176	-0.0698	-0.1262	-0.0661	1.0000	-0.1082	0.2359	-0.1384	-0.0985	-0.1339
APPLE-37	-0.0470	-0.1486	-0.0750	0.1420	-0.1082	1.0000	-0.1711	-0.0400	0.0533	-0.1700
APPLE-38	-0.0699	-0.2303	-0.1319	-0.0494	0.2359	-0.1711	1.0000	0.0841	0.0456	0.0024
APPLE-39	-0.1751	0.1142	-0.1076	0.0732	-0.1384	-0.0400	0.0841	1.0000	0.1543	0.0958
APPLE-40	0.2899	-0.2067	0.0329	-0.0314	-0.0985	0.0533	0.0456	0.1543	1.0000	-0.0966
APPLE-41	-0.1644	0.0682	-0.1051	-0.1406	-0.1339	-0.1700	0.0024	0.0958	-0.0966	1.0000
APPLE-42	0.2566	-0.1865	-0.0894	0.3801	-0.2103	0.1683	0.0752	0.0046	0.3462	-0.2163
APPLE-43	0.4512	-0.1562	0.0244	0.3289	-0.1235	0.3238	-0.0220	-0.1631	0.2276	-0.2013
APPLE-44	0.1523	0.1022	-0.1236	0.1579	0.1522	-0.0617	-0.0984	0.0563	-0.0782	0.1813
APPLE-45	0.0781	0.3094	0.1249	-0.0973	0.1214	0.1335	0.1598	-0.0154	0.0151	0.0636
APPLE-46	-0.0793	-0.2299	0.0844	0.2753	0.3361	-0.0497	0.2809	0.0243	-0.0479	0.0209
APPLE-47	-0.1176	-0.0372	0.4539	0.1728	-0.0253	0.0725	0.0673	-0.0233	0.1562	-0.2368
APPLE-48	-0.1350	-0.0977	0.0479	-0.0878	-0.1167	0.0203	-0.1463	0.1244	-0.1276	0.1788
APPLE-49	0.1854	0.0091	-0.0329	0.0564	-0.1538	-0.1057	-0.0456	-0.1270	-0.0610	0.0356
APPLE-50	-0.1037	0.2048	0.3147	-0.0905	0.0846	0.0153	0.1381	0.2166	-0.0282	-0.2038
CATCH-GN	-0.0550	-0.1834	0.0033	0.0751	0.0256	0.0770	-0.0890	0.1018	0.0593	0.1135
CATCH-GN	-0.0668	-0.0415	-0.0057	-0.1492	-0.0017	-0.1575	0.1184	-0.0109	-0.0172	0.2973
MTHAP-GN	0.1275	-0.2910	-0.0338	0.1103	0.0756	-0.0037	0.1456	-0.1240	-0.0199	0.2352
TOTMA-GN	0.0358	-0.2399	0.0463	0.0014	0.0511	-0.0207	0.1142	-0.0428	0.0229	0.2866

	APPLE-42	APPLE-43	APPLE-44	APPLE-45	APPLE-46	APPLE-47	APPLE-48	APPLE-49	APPLE-50	CATCN-GN
WC-----1	C.0335	-C.0530	0.0735	0.1233	-C.1138	-0.1279	0.0891	-0.1335	0.0451	-0.2044
WC-----2	-0.0282	0.0799	0.1469	-0.0956	-0.0417	-0.0579	-0.2807	0.0887	0.1569	-0.1232
WC-----3	C.1250	0.1262	0.1353	-0.0871	0.0441	0.0110	-0.2985	0.0968	0.1359	-0.2092
WC-----4	0.0476	-C.0079	0.0281	-0.2066	-0.1534	-0.0673	-0.2061	-0.0711	0.3551	-0.1282
WC-----5	0.2721	0.1469	0.0016	0.1727	-0.0487	0.0041	-0.0650	0.1839	0.1011	-0.0580
WC-----6	0.0495	-0.1110	-0.1125	-0.2257	-0.1202	-0.0594	0.0700	-0.1052	-0.1734	0.0961
WC-----7	0.0513	-0.0642	-0.0200	-0.1662	-0.0957	-0.0760	0.1748	-0.1268	-0.1354	0.0845
WD-----8	0.2047	0.2423	0.0526	-0.0102	0.1311	0.1792	-0.0849	-0.0739	0.1028	-0.1366
WC-----9	0.1982	0.2074	0.1791	-0.0582	-0.0039	0.1351	-0.0301	0.1066	0.0116	-0.1494
WC----10	0.1834	0.2657	-0.0081	0.0922	0.0755	0.2001	0.0258	0.0934	0.1735	-0.3763
WC----11	0.0082	-0.0560	0.0986	-C.0455	C.2364	0.2102	0.2376	0.2115	-0.1914	0.1495
WC----12	C.1342	C.0275	-0.0796	0.0233	0.2571	0.2433	0.2937	0.1396	-0.1962	0.1032
WC----13	C.1324	-0.0375	0.1045	0.0851	-0.1359	0.0822	0.0356	0.2651	-0.1780	0.0969
WC----14	-0.0569	-0.0419	-0.1470	-0.0572	-C.2636	-0.0766	0.1591	-0.1371	-0.0565	-0.1035
WD----15	0.0396	-0.0532	0.0311	-0.0084	-0.0614	-0.0482	0.2232	-0.1458	-0.1857	0.1053
WC----16	0.0701	-C.1103	0.1059	-0.1343	0.0116	-0.0498	0.1731	-0.0921	-0.0727	0.0663
WC----17	-C.0419	-C.0798	0.0459	-C.0111	0.0520	0.1555	-0.0433	0.0720	0.0310	-0.2527
WC----18	-0.1761	-C.2704	-0.0922	0.1898	-0.0679	0.0148	-0.0314	0.0355	0.1148	-0.2310
WC----19	C.0212	C.0581	0.1749	0.1898	0.2823	0.2592	0.2831	-0.0127	0.0709	-0.1343
WC----20	C.0858	C.2025	0.0314	0.0437	0.1425	-0.1584	-0.1926	-0.0249	-0.0911	-0.0297
WC----21	-0.1098	-0.1146	-0.0899	-0.2829	-0.1027	-0.0187	-0.0749	0.1320	-0.1150	0.0574
WC----22	-C.0523	0.0593	-0.1562	0.1036	-C.0156	-0.1105	0.1388	-0.1211	0.1326	-0.1106
WC----23	-C.0456	-0.2086	-0.0279	0.1153	0.0523	-0.1864	0.1664	-0.1977	-0.0394	0.2105
WC----24	0.0117	-C.1549	0.0311	-C.1420	-0.0431	-0.1006	0.1283	-0.1105	-0.0392	0.0307
WC----25	C.0575	-C.1427	0.0602	-0.0700	-0.0141	-0.0731	0.1696	-0.1198	-0.1486	0.0886
WC----26	-0.0047	-C.1069	0.1327	-0.2195	0.0917	-0.0337	0.0877	-0.0791	-0.1116	0.1444
WC----27	-0.0084	-C.0614	0.0179	-0.0947	-0.0752	-0.0859	0.1526	-0.1210	-0.0601	0.0277
WC----28	-0.0697	-0.1184	-0.0532	0.2256	0.0807	-0.1462	-0.0962	0.0364	0.1185	-0.1531
WC----29	-C.0752	-0.0349	-0.0161	-0.4581	-0.1137	0.0106	-0.0688	0.1412	-0.1120	0.1898
WC----30	0.0805	-C.0380	-0.2948	-0.1318	-0.1252	0.1254	0.0335	0.0999	-0.0649	-0.0230

Grade 5 Math (continued)

	APPLE-42	APPLE-43	APPLE-44	APPLE-45	APPLE-46	APPLE-47	APPLE-48	APPLE-49	APPLE-50	CATCN-GN
RAMOS--1	-0.0029	-0.1006	0.2344	-0.0210	-0.0983	0.0749	-0.2147	0.0776	0.0277	0.0417
RAMOS--2	0.0987	0.1188	-0.0527	-0.1250	0.1049	0.3378	-0.1303	-0.0252	-0.0629	0.1438
RAMOS--3	-0.0867	-0.1902	0.3159	0.0712	-0.1803	-0.1747	-0.1517	0.1122	0.0776	-0.0546
RAMOS--4	0.0972	-0.1243	-0.1155	0.0730	-0.1381	-0.0499	0.1700	-0.0515	-0.0369	-0.0312
RAMOS--5	-0.0695	-0.0988	-0.0259	-0.0493	-0.0007	-0.0806	-0.0192	-0.0152	0.1280	-0.1835
RAMOS--6	0.2831	-0.1346	0.2574	0.0052	0.0030	0.0299	0.2433	0.0445	0.0044	0.0425
RAMOS--7	0.0864	0.0081	0.2678	0.1007	-0.1789	-0.0119	-0.2528	0.1129	-0.1121	-0.1152
RAMOS--8	-0.1784	-0.1653	0.0101	0.0096	0.2797	0.0113	0.0629	-0.0765	-0.0176	0.0775
RAMOS--9	0.0687	0.0699	0.2700	0.1330	-0.0921	-0.0741	-0.1874	0.0926	-0.0668	-0.0764
RAMOS-10	0.1235	-0.2291	0.0172	-0.0551	0.2092	0.2753	-0.0350	-0.0559	0.2136	0.1371
RAMOS-11	0.1707	0.1191	0.2599	0.1162	0.0249	-0.2056	-0.1921	0.2020	-0.0218	-0.1158
RAMOS-12	0.0735	0.0269	0.1909	0.1749	0.0296	0.1316	-0.1328	-0.0909	0.0348	0.0591
RAMOS-13	-0.2072	-0.1554	0.0957	0.1839	0.1825	0.1404	0.0639	-0.0065	-0.0056	0.0657
RAMOS-14	0.2643	0.1063	0.1412	-0.0761	0.0146	-0.0192	0.1791	-0.0826	0.1055	-0.1787
RAMOS-15	-0.0495	-0.0548	0.1787	0.1263	-0.1461	-0.0888	-0.1974	0.1330	-0.1061	-0.0091
RAMOS-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RAMOS-17	0.3494	0.2220	0.3353	-0.0992	0.2674	0.4128	-0.0896	-0.0259	0.1544	0.0223
RAMOS-18	0.4115	-0.0571	-0.0530	-0.0786	-0.0336	0.0735	0.2051	0.0564	0.0274	0.0459
RAMOS-19	-0.0860	-0.1064	-0.1248	0.0653	0.1735	0.0630	-0.0494	-0.0847	0.0066	0.1476
RAMOS-20	0.2565	-0.1005	-0.0458	0.0031	0.0638	-0.0681	-0.0975	0.1081	0.2102	0.0626

	APPLE-42	APPLE-43	APPLE-44	APPLE-45	APPLE-46	APPLE-47	APPLE-48	APPLE-49	APPLE-50	CATCN-GN
APPLE--1	-C.1928	-C.0742	-0.0363	0.0972	0.3434	0.0160	0.1322	-0.1115	0.0206	0.1169
APPLE--2	0.1220	0.3047	0.0706	C.0537	0.1101	-0.0430	0.0421	0.0690	0.1652	-0.1313
APPLE--3	0.0389	0.0161	-0.0747	0.1562	0.2708	0.0110	0.0656	-0.0635	-0.1959	0.1145
APPLE--4	-C.1491	-C.1274	0.1100	0.4752	-0.0638	-0.0618	-0.0954	-0.2211	0.0111	0.0969
APPLE--5	0.1270	-0.0269	0.0931	0.0596	-0.0458	0.3468	-0.1137	-0.1517	0.2930	0.1017
APPLE--6	0.2633	0.0809	-0.1048	0.0656	0.3489	0.1791	0.1277	-0.1339	0.1399	0.1873
APPLE--7	0.1958	0.0173	-0.0752	0.2863	0.0078	-0.0488	-0.0497	-0.0378	0.1278	-0.1323
APPLE--8	0.0623	0.1192	0.3207	0.1551	-0.1355	-0.1507	0.1038	0.0424	-0.1014	0.1598
APPLE--9	0.2281	0.0112	-0.0015	0.1477	0.0774	0.1140	0.1297	-0.0700	0.2826	-0.1345
APPLE-10	-0.1028	0.0224	-0.1133	0.1281	-0.2405	-0.2605	0.0143	0.6601	-0.1528	-0.3646
APPLE-11	-0.1323	-C.0218	-0.0478	0.1768	-0.0762	0.0216	0.0071	-0.1689	0.0594	-0.1678
APPLE-12	0.1485	0.0147	-0.0010	0.0478	-0.0557	0.4325	-0.0138	-0.0646	-0.0520	0.3347
APPLE-13	-C.0167	-0.0899	-0.1687	0.0303	-0.2066	-0.1452	0.0107	0.7407	0.0679	-0.2344
APPLE-14	-C.1111	-0.1869	-0.0571	0.2485	-0.1537	-0.1091	-0.1500	0.3992	-0.0149	-0.0784
APPLE-15	0.2237	0.2736	-0.0190	0.0847	0.3875	0.3499	0.0775	-0.0757	-0.0177	-0.0733
APPLE-16	C.2257	0.4912	0.3056	-0.0848	0.3203	0.1156	-0.0455	0.0876	-0.1262	-0.2752
APPLE-17	0.0262	0.0570	0.0072	-0.0016	-0.0739	0.0347	0.1271	-0.1198	0.2023	-0.1020
APPLE-19	-C.1550	-0.1011	0.0263	0.1246	-0.2145	-0.0326	0.1089	0.1150	0.1257	-0.0594
APPLE-20	0.1149	-C.0250	C.1348	0.2958	0.0286	-0.0919	-0.1532	0.1067	0.0508	-0.2615
APPLE-21	-0.0200	-0.0813	-C.0494	0.1367	0.0430	-0.1031	-0.0780	-0.0609	-0.0402	-0.0080
APPLE-22	0.0763	C.0939	-0.0079	0.0421	0.3794	0.3774	0.2660	-0.1735	0.1576	0.1205
APPLE-23	0.3410	C.2648	0.0060	C.0574	0.2726	-0.0187	-0.1914	0.1682	-0.0722	0.0430
APPLE-24	0.0044	-C.1849	0.1834	0.1742	0.1707	-0.1103	0.0512	-0.0996	-0.0504	0.1090
APPLE-25	-0.0907	-0.0314	0.0408	0.1172	-0.1473	-0.1108	0.0072	-0.0977	-0.1055	0.1425
APPLE-26	C.2949	C.3633	0.1131	0.0428	0.4774	0.3139	0.3021	-0.0302	-0.1439	0.0108
APPLE-27	-0.0245	-C.0339	-0.1444	0.2110	-0.2859	-0.0528	0.2707	-0.1237	-0.0450	-0.0434
APPLE-28	C.0814	0.0292	-0.0743	0.0829	0.2250	0.1759	0.2143	-0.0964	0.0255	-0.0156
APPLE-29	-0.0371	0.0666	0.3904	0.0852	0.1973	-0.0548	0.2548	-0.0259	-0.1796	-0.0991
APPLE-30	0.1185	-C.0396	-0.0450	0.1539	-0.0623	0.2264	0.0218	-0.1302	0.0204	0.1133

Grade 5 Math (continued)

	APPLE-42	APPLE-43	APPLE-44	APPLE-45	APPLE-46	APPLE-47	APPLE-48	APPLE-49	APPLE-50	CATCN-GN
APPLE-31	0.3767	-0.0711	-0.0926	0.1013	-0.0472	-0.0299	0.0741	-0.0541	0.2619	-0.0131
APPLE-32	0.2566	0.4512	0.1523	0.0781	-0.0793	-0.1176	-0.1350	0.1854	-0.1037	-0.0550
APPLE-33	-0.1865	-0.1562	0.1022	0.3094	-0.2299	-0.0372	-0.0977	0.0091	0.2048	-0.1834
APPLE-34	-0.0894	0.0244	-0.1236	0.1249	0.0844	0.4539	0.0479	-0.0329	0.3147	0.0033
APPLE-35	0.3801	0.3289	0.1579	-0.0973	0.2753	0.1728	-0.0878	0.0564	-0.0905	0.0751
APPLE-36	-0.2103	-0.1235	0.1522	0.1214	0.3361	-0.0253	-0.1167	-0.1538	0.0846	0.0256
APPLE-37	0.1683	0.3238	-0.0617	0.1335	-0.0497	0.0725	0.0203	-0.1057	0.0153	0.0770
APPLE-38	0.0752	-0.0220	-0.0984	0.1598	0.2809	0.0673	-0.1463	-0.0456	0.1381	-0.0890
APPLE-39	0.0046	-0.1631	0.0563	-0.0154	0.0243	-0.0233	0.1244	-0.1270	0.2166	0.1018
APPLE-40	0.3462	0.2276	-0.0782	0.0151	-0.0479	0.1562	-0.1276	-0.0610	-0.0282	0.0593
APPLE-41	-0.2163	-0.2013	0.1813	0.0636	0.0209	-0.2368	0.1788	0.0356	-0.2038	0.1135
APPLE-42	1.0000	0.5099	-0.0014	-0.0156	0.0409	0.1112	0.1123	0.1021	0.0292	0.0807
APPLE-43	0.5099	1.0000	0.0316	-0.0230	0.2186	0.1305	0.0557	0.0882	-0.2029	-0.0590
APPLE-44	-0.0014	0.0316	1.0000	-0.0006	0.3286	-0.0631	-0.0274	0.0742	-0.0858	0.0192
APPLE-45	-0.0156	-0.0230	-0.0006	1.0000	-0.0033	0.0684	0.0883	0.0113	0.0194	-0.2132
APPLE-46	0.0409	0.2186	0.3286	-0.0033	1.0000	0.2437	0.1392	-0.0478	-0.1357	0.2061
APPLE-47	0.1112	0.1305	-0.0631	0.0684	0.2437	1.0000	0.0125	-0.1155	0.0537	0.1786
APPLE-48	0.1123	0.0557	-0.0274	0.0883	0.1392	0.0125	1.0000	-0.1405	-0.2224	0.0790
APPLE-49	0.1021	0.0882	0.0742	0.0113	-0.0478	-0.1155	-0.1405	1.0000	-0.0909	-0.3526
APPLE-50	0.0292	-0.2029	-0.0858	0.0194	-0.1357	0.0537	-0.2224	-0.0909	1.0000	-0.0985
CATCN-GN	0.0807	-0.0590	0.0192	-0.2132	0.2061	0.1786	0.0790	-0.3526	-0.0985	1.0000
CATCM-GN	-0.0962	-0.2436	-0.0853	-0.2157	-0.0282	-0.0729	0.0330	-0.3553	0.0997	0.2672
MTHAP-GN	0.0794	0.0196	0.2025	-0.0649	0.3358	0.0479	0.1625	-0.4949	-0.1117	0.2064
TOTMA-GN	0.0365	-0.1089	0.0938	-0.1556	0.2600	0.0988	0.1390	-0.5747	-0.0163	0.5356

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	CATCM-GN	MTHAP-GN	TCTMA-GN
WC-----1	-0.0762	-C.0169	-0.0920
WC-----2	-0.1911	-C.1620	-0.2243
WC-----3	-0.0438	-C.0234	-0.0979
WC-----4	0.1029	-C.0118	-0.0162
WC-----5	0.0307	0.0419	0.0139
WC-----6	-0.1091	0.1386	0.0720
WC-----7	0.0168	0.1782	0.1616
WC-----8	-C.0331	0.1459	0.0445
WC-----9	-0.0474	C.1475	0.0344
WC----10	-0.1869	C.1129	-0.0808
WC----11	C.0637	C.0788	0.1231
WC----12	C.0576	0.0180	0.0707
WC----13	0.0334	-C.1618	-0.0440
WC----14	C.0367	C.0971	C.0691
WC----15	0.0419	0.1826	0.1809
WC----16	0.0235	C.2634	0.2015
WC----17	C.0871	0.1678	0.0591
WC----18	-C.C236	-C.0439	-0.0942
WC----19	-0.0542	C.1339	0.0440
WC----20	C.0728	C.1610	0.1201
WC----21	0.1685	-C.2558	-0.1080
WC----22	0.0472	-C.0248	-0.0273
WC----23	C.0636	0.2124	0.2279
WC----24	0.1081	C.2665	0.2293
WC----25	0.0344	C.2633	0.2087
WC----26	0.0323	0.2349	0.2073
WC----27	0.1400	C.1803	0.1999
WC----28	-0.0105	C.0964	-0.0258
WC----29	0.0683	-C.2811	-0.1545
WC----30	C.0191	-C.1706	-0.1187

Grade 5 Math (continued)

	CATCH-GN	MTHAP-GN	TCTMA-GN
RAMCS--1	-C.1121	C.0348	0.0114
RAMCS--2	0.0675	C.2818	0.2367
RAMOS--3	-0.1507	-0.2CC0	-0.1864
RAMOS--4	C.1CC3	C.1165	0.0971
RAMCS--5	0.0982	C.1276	0.0768
RAMOS--6	0.0644	C.2CC9	0.1790
RAMCS--7	-C.2879	-0.2C84	-0.2719
RAMCS--8	0.1680	C.3285	0.2831
RAMOS--9	-C.1639	-C.0516	-0.1041
RAMCS-1C	C.0274	C.2384	0.2302
RAMOS-1L	-C.1865	-C.1142	-0.1669
RAMCS-12	-0.1432	0.0186	0.0098
RAMOS-13	-C.C210	0.1123	0.1105
RAMCS-14	-0.2261	0.0470	-0.0786
RAMCS-15	-0.0782	-0.0792	-0.0759
RAMOS-16	0.0	C.0	0.0
RAMCS-17	-0.0781	0.2625	0.1438
RAMCS-18	0.0152	C.0345	0.0568
RAMOS-19	-0.0813	-0.0202	0.0142
RAMOS-20	-C.0310	-C.0724	-0.0459

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	CATCM-GN	MTHAP-GN	TOTMA-GN
APPLE--1	-C.0398	C.0295	0.0296
APPLE--2	-0.0006	C.2361	0.1204
APPLE--3	-0.0137	C.0690	0.0654
APPLE--4	-C.0554	C.2061	0.1480
APPLE--5	-0.1815	-C.0126	-0.0004
APPLE--6	-C.0268	0.1323	0.1585
APPLE--7	C.0135	0.0255	-0.0293
APPLE--8	-0.1691	0.0204	0.0022
APPLE--9	-0.1380	0.0260	-0.0419
APPLE-10	-0.3121	-C.4555	-0.5433
APPLE-11	0.0467	-0.0226	-0.0575
APPLE-12	-0.0550	-C.0156	C.0727
APPLE-13	-0.4354	-0.6314	-0.6645
APPLE-14	-0.1908	-0.3913	-0.3436
APPLE-15	-C.0360	C.0695	0.0381
APPLE-16	-0.2204	0.1427	-0.0631
APPLE-17	0.1409	-C.1567	-0.0599
APPLE-19	-0.2589	-0.2104	-0.2546
APPLE-20	-0.0284	-0.0793	-0.1458
APPLE-21	0.0280	-C.1128	-0.0459
APPLE-22	C.0140	0.1890	0.1828
APPLE-23	C.0444	C.2057	0.1555
APPLE-24	-0.0065	C.2219	0.1645
APPLE-25	-0.0199	-C.1342	-0.0581
APPLE-26	-0.1235	0.2273	0.0711
APPLE-27	0.0534	-C.1086	-0.0559
APPLE-28	0.0328	0.2175	0.1311
APPLE-29	-0.1015	-0.0201	-0.0827
APPLE-30	C.1463	C.0700	0.1498

Grade 5 Math (continued)

	CATCM-GN	MTHAP-GN	TCTMA-GN
APPLE-31	0.1033	0.1052	0.1011
APPLE-32	-0.0668	0.1275	0.0358
APPLE-33	-0.0415	-0.2910	-0.2399
APPLE-34	-0.0057	-0.0338	0.0463
APPLE-35	-0.1492	0.1103	0.0014
APPLE-36	-0.0017	0.0756	0.0511
APPLE-37	-0.1575	-0.0037	-0.0207
APPLE-38	0.1184	0.1456	0.1142
APPLE-39	-0.0109	-0.1240	-0.0428
APPLE-40	-0.0172	-0.0199	0.0229
APPLE-41	0.2973	0.2352	0.2866
APPLE-42	-0.0962	0.0794	0.0365
APPLE-43	-0.2436	0.0196	-0.1089
APPLE-44	-0.0853	0.2025	0.0938
APPLE-45	-0.2157	-0.0649	-0.1556
APPLE-46	-0.0282	0.3358	0.2600
APPLE-47	-0.0729	0.0479	0.0988
APPLE-48	0.0430	0.1625	0.1390
APPLE-49	-0.3553	-0.4949	-0.5747
APPLE-50	0.0997	-0.1117	-0.0163
CATCN-GN	0.2672	0.2064	0.5356
CATCM-GN	1.0000	0.4020	0.7085
MTHAP-GN	0.4020	1.0000	0.8607
TCTMA-GN	0.7085	0.8607	1.0000

BEGINNING TEACHER EVALUATION STUDY: FINAL REPORT

VOLUME I, APPENDIX B

CORRELATIONS AMONG THE VARIABLES USED IN THE FINAL STRUCTURAL ANALYSIS

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BEGINNING TEACHER EVALUATION STUDY: FINAL REPORT

Volume I, Appendix B

CORRELATIONS AMONG THE VARIABLES USED IN THE FINAL STRUCTURAL ANALYSIS

List of Variables

Domains	Variables	Title
Teaching Performances	WD-1	Preparation and teaching time
	WD-2	Variety of specific skills taught
	WD-3	Conceptualization of the instructional design
	WD-4	Variety of instructional contexts
	WD-5	Variety of materials
	RAMOS-1	Teaching and support time
	RAMOS-2	Pupil skill practice time
	RAMOS-3	Variety of materials
	RAMOS-4	Pupil seatwork time
Student's Behavior	APPLE-1	Pupil productivity
	APPLE-2	Inattentive pupil behavior
	APPLE-3	Attentive pupil behavior
Teaching Performances	APPLE-4	Other adults in the classroom
	APPLE-5	Independent pupil work
	APPLE-6	Teacher-group context
	APPLE-7	Teacher-class context
	APPLE-8	Organize and manage instruction
	APPLE-9	Monitor pupil progress
	APPLE-10	Develop pupil understanding
	APPLE-11	Teacher mobility
	APPLE-12	Responsiveness to individual pupils
	APPLE-13	Control of pupil behavior
	APPLE-14	Nonresponsive to individual pupil behavior
Teacher Characteristics	TCH--SEX	Age
	TCH--AGE	Sex
	T-YRSSCH	Years at school
	T-YRSTCH	Years teaching
	T-ED. LEV	Educational level

List of Variables (continued)

Domains	Variables	Title
Support for Innovation	EX-T & A	Number of extra teachers and aides
Organizational Structure	DIS. FUND	Total amount of district funds received
	PRIN-CHG	Principal stimulates change
	INS. COMP	Instructional complexity
	TEAMING	Degree of teaming
	CONCENUS	Student consensus factor
	CENTRALD	Centralization of decision-making
Principal's Perceptions of Organization	S. STYLE	Superintendent's administrative style
	P. STYLE	Principal's (perceived) administrative style
Teacher's Perceptions of Organization	PSTYLE-T	Principal's administrative style
	CLASS CL	Class climate
Teacher's Attitudes	ASPIRAT.	Aspirations
	SATISFCT	Satisfaction
	T.P. STUD	Teacher's perception of student characteristics
Teacher's Knowledge of Subject and of Teaching	TEACH. KN	Teacher's knowledge of teaching
	SUBJECTK	Teacher's knowledge of subject
Teacher's Aptitudes	VERB. FL.	Verbal fluency
	MEMORY	Memory
	REASONNG	Reasoning
	FLEXIBLE	Flexibility
	T COGSTY	Cognitive style
Student's Aptitudes	SFTAA	Verbal aptitude
	S COGSTY	Cognitive style
Student's Attitudes	S-ATT.-F	Fall attitude toward reading and mathematics
	S-ATT.-S	Spring attitude toward reading and mathematics

List of Variables (continued)

Domains	Variables	Title
Student's Expectations	S-EXP.-F	Fall expectations of reading and mathematics
	S-EXP.-S	Spring expectations of reading and mathematics
Student Learning	CAT RCMP	CAT reading comprehension
	READ APP	Reading application
	DECODING	Decoding
	READ ACH	Reading achievement
	TOT READ	Reading total
	CAT MCMP	CAT mathematics concepts
	CAT MCOM	CAT mathematics computation
	MATH APL	Mathematics application
	MATH TOT	Mathematics total

Final Structural Analysis
Grade 2 Reading

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CORRELATION:

	WD-----1	WD-----2	WD-----3	WD-----4	WD-----5	RAMOS--1	RAMOS--2	RAMOS--3	RAMOS--4	APPLE--1
WD-----1	1.0000	0.0173	0.1091	0.1686	0.1905	0.0187	-0.0015	-0.0965	0.0971	-0.1299
WD-----2	0.0173	1.0000	-0.0194	0.2949	0.1898	0.1636	0.2808	0.0241	0.0506	-0.1018
WD-----3	0.1091	-0.0194	1.0000	0.0351	0.4115	0.1860	0.0660	0.1331	0.1717	0.1309
WD-----4	0.1686	0.2949	0.0351	1.0000	0.2040	0.2617	0.1442	-0.1131	-0.0730	-0.0802
WD-----5	0.1905	0.1898	0.4115	0.2040	1.0000	0.3041	0.0443	-0.0216	-0.0429	-0.2113
RAMOS--1	0.0187	0.1636	0.1860	0.2617	0.3041	1.0000	0.6280	0.3499	0.2229	-0.3606
RAMOS--2	-0.0015	0.2808	0.0660	0.1442	0.0443	0.6280	1.0000	0.6143	0.5221	-0.1401
RAMOS--3	-0.0965	0.0241	0.1331	-0.1131	-0.0216	0.3499	0.6143	1.0000	0.6919	-0.0390
RAMOS--4	0.0971	0.0506	0.1717	-0.0730	-0.0429	0.2229	0.5221	0.6919	1.0000	0.0639
APPLE--1	-0.1299	-0.1018	0.1309	-0.0802	-0.2113	-0.3606	-0.1401	-0.0390	0.0639	1.0000
APPLE--2	0.0558	-0.1004	-0.1276	0.2515	0.1945	0.2160	0.0373	0.0042	-0.0448	-0.4010
APPLE--3	0.0183	0.0345	-0.4044	-0.1741	-0.3657	0.0863	0.2611	0.2621	0.0567	0.0377
APPLE--5	0.0083	-0.0369	0.0720	-0.1242	-0.0025	0.3332	0.0952	0.0706	-0.1346	-0.2043
APPLE--6	-0.2992	-0.1259	-0.2339	-0.4403	-0.2344	-0.1578	-0.0942	0.1790	0.0644	0.3693
APPLE--7	0.1717	0.1853	0.0859	0.3912	0.0992	-0.0765	0.1350	0.1391	0.2564	0.1435
APPLE--8	-0.2629	0.0043	-0.2373	0.0957	-0.2359	0.0965	0.2507	0.0086	0.0327	-0.0040
APPLE--9	-0.2759	0.1000	-0.0313	-0.1419	-0.0045	0.0456	0.1805	0.1975	0.0963	0.1659
APPLE-10	0.1899	-0.0382	0.0149	-0.1536	-0.0026	-0.0830	0.1634	0.1043	0.0703	0.3344
APPLE-11	0.4572	-0.0136	-0.2289	0.3780	-0.2137	0.0033	-0.0131	-0.0567	-0.0815	-0.0677
APPLE-12	-0.1842	-0.3028	0.0863	-0.3831	0.0294	-0.2235	-0.0740	0.2494	-0.0154	0.2515
APPLE-13	0.1537	0.3979	0.0414	0.2009	0.2751	0.0286	0.0581	0.1328	0.1107	-0.0150
APPLE-14	0.0484	-0.1207	-0.1211	-0.0202	-0.2830	-0.0754	-0.0744	-0.0858	0.0557	0.1391
TCH--SEX	-0.0581	0.0564	0.0650	-0.3614	0.1206	-0.1057	-0.2865	0.0553	-0.0746	-0.0162
TCH--AGE	0.0961	-0.0839	-0.0393	-0.1632	-0.1793	-0.0365	0.1167	0.1514	0.2326	0.3765
T-YRSSCH	-0.2623	-0.0328	-0.1347	-0.2840	-0.2191	-0.0280	-0.0494	0.0647	0.0414	0.4867
T-YRSTCH	0.0183	-0.2288	0.0085	-0.0973	-0.1488	0.0389	0.0356	-0.0420	0.0424	0.2491
T-ED.LEV	0.1476	-0.1294	-0.0193	0.1913	0.0264	-0.2277	-0.2445	-0.1735	-0.1570	0.1718
EX-T & A	0.3040	-0.0477	-0.0092	-0.2680	-0.1046	-0.4221	-0.3265	-0.2071	-0.1338	0.1539
DIS.FUND	0.1197	-0.0093	0.0005	0.3079	0.0503	0.1201	0.1866	0.0614	0.0687	0.3108
PRIN-CHG	-0.0808	0.1940	0.1284	0.1776	0.0669	0.0919	0.0056	0.0988	0.0814	0.0968

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Final Structural Analysis
Grade 2 Reading (continued)

CORRELATIONS

	WD-----1	WD-----2	WD-----3	WD-----4	WD-----5	RAMOS--1	RAMOS--2	RAMOS--3	RAMOS--4	APPLE--1
INS.COMP	0.0352	-0.0130	0.2318	0.1399	0.2093	0.0131	-0.0444	-0.3226	-0.4171	0.0662
TEAMING	-0.1247	0.0399	-0.0609	0.0783	-0.0413	0.0661	0.0766	-0.1487	-0.1691	-0.1255
CONSENSUS	0.1473	-0.2610	-0.0500	0.0243	0.1057	-0.0290	-0.1997	-0.0860	0.0174	-0.0894
CENTRALD	0.1579	0.1385	-0.1470	0.0282	0.0754	0.0421	0.0522	0.0198	0.0077	-0.0273
PRINHELP	-0.0633	-0.1920	-0.0113	-0.2613	0.0698	0.0204	-0.0641	-0.0522	-0.0548	-0.0239
S. STYLE	-0.0327	0.1915	0.2790	-0.0337	-0.0198	-0.1078	-0.1649	-0.1247	-0.0867	0.1506
P. STYLE	-0.1275	0.1698	0.1494	0.0745	0.0659	0.0002	-0.0345	-0.2645	-0.1665	0.1410
PSTYLE-T	0.0334	0.0667	-0.0802	-0.2116	-0.1989	-0.1038	0.2200	0.2305	0.1116	0.1611
CLASS CL	0.1953	0.0419	0.3031	0.1916	0.2366	-0.2221	-0.0248	-0.0750	-0.0637	0.2700
ASPIRAT.	0.1363	0.0273	0.0627	0.4146	0.1311	0.0024	0.1031	0.1129	-0.0090	0.0175
SATISFCT	0.0045	-0.0616	0.2120	0.0387	0.0209	-0.1044	0.0498	0.1791	0.0468	0.3592
T.P.STUD	-0.0897	-0.0144	0.3173	-0.0111	0.4552	-0.0658	-0.0333	-0.3462	-0.2147	0.0593
TEACH.KN	0.3398	0.0180	-0.0316	0.0937	-0.1144	0.1540	0.0559	-0.0766	-0.0150	-0.1609
SUBJECTK	-0.3082	-0.1088	-0.2995	-0.2854	-0.1498	-0.1124	0.0284	0.0636	-0.0520	0.0742
VERB.FL.	0.0383	0.0760	0.0631	-0.3113	0.2093	-0.1186	-0.0562	-0.1366	-0.1626	0.0669
MEMORY	-0.0388	-0.0934	0.0981	-0.0425	0.0349	-0.0861	0.0666	0.0510	-0.0156	-0.0150
REASONNG	-0.2505	-0.1311	0.0628	-0.0397	-0.0684	-0.1607	0.0507	-0.2070	-0.2921	0.1063
FLEXIBLE	-0.0729	-0.0448	0.0062	-0.1854	0.1499	-0.1541	-0.1127	-0.2440	-0.1424	0.0224
T COGSTY	-0.1320	-0.1692	-0.0704	-0.2149	-0.1521	-0.2767	-0.2789	-0.2266	-0.1338	-0.0457
SFTAA	-0.1736	0.0080	0.0662	-0.0561	0.2610	-0.0791	-0.0096	-0.1328	-0.0895	0.0770
S COGSTY	-0.0644	-0.1636	0.1562	-0.2078	0.2147	-0.3452	-0.1576	-0.1551	-0.1040	0.0694
S-ATT.-F	-0.0602	-0.0901	-0.1510	-0.0216	-0.1813	-0.1195	-0.1122	0.0002	-0.0370	0.2128
S-ATT.-S	0.0796	-0.1210	-0.1977	-0.0329	-0.3736	-0.1516	-0.1350	0.0154	0.1122	0.2490
S-EXP.-F	0.0214	-0.1780	-0.0897	-0.1764	0.0883	-0.2535	-0.1055	-0.0746	0.0630	-0.0069
S-EXP.-S	-0.0026	-0.1132	-0.2160	0.0240	0.2886	-0.2347	-0.2289	-0.2570	-0.0984	0.0170
CAT RCMP	-0.1571	-0.0770	-0.0017	-0.0609	0.0895	-0.2524	-0.3842	0.0430	-0.1696	0.0749
READ APP	-0.0422	0.1225	0.0913	-0.2473	-0.1589	-0.1140	0.0088	0.3035	0.2149	0.1428
DECODING	0.1051	-0.0976	0.0707	0.0769	-0.2507	-0.2414	-0.0418	0.2972	0.3233	0.3599
READ ACH	-0.0365	0.0482	-0.0632	0.0935	0.1445	-0.1054	-0.0830	-0.0027	0.1066	0.0937
TOT READ	-0.0711	0.0592	0.0827	-0.2671	-0.0141	-0.1901	-0.1626	0.1925	0.0987	0.2244
PSEUDO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Final Structural Analysis
Grade 2 Reading (continued)

CORRELATIONS

	APPLE--2	APPLE--3	APPLE--5	APPLE--6	APPLE--7	APPLE--8	APPLE--9	APPLE-10	APPLE-11	APPLE-12
WD-----1	0.0558	0.0183	0.0083	-0.2992	0.1717	-0.2629	-0.2759	0.1899	0.4572	-0.1842
WD-----2	-0.1004	0.0345	-0.0369	-0.1259	0.1853	0.0043	0.1000	-0.0382	-0.0136	-0.3026
WD-----3	-0.1276	-0.4044	0.0720	-0.2339	0.0859	-0.2373	-0.0313	0.0149	-0.2284	0.0803
WD-----4	0.2515	-0.1741	-0.1242	-0.4403	0.3912	0.0957	-0.1419	-0.1336	0.3760	-0.3851
WD-----5	0.1945	-0.3657	-0.0025	-0.2344	0.0992	-0.2359	-0.0045	-0.0026	-0.2137	0.0494
RAMOS--1	0.2160	0.0863	0.3332	-0.1578	-0.0765	0.0965	0.0456	-0.0830	0.0033	-0.2235
RAMOS--2	0.0373	0.2611	0.0952	-0.0942	0.1350	0.2507	0.1805	0.1634	-0.0131	-0.0740
RAMOS--3	0.0042	0.2621	0.0706	0.1790	0.1391	0.0086	0.1975	0.1043	-0.0567	0.2494
RAMOS--4	-0.0448	0.0537	-0.1346	0.0644	0.2564	0.0327	0.0963	0.0700	-0.0615	-0.0179
APPLE--1	-0.4010	0.0377	-0.2843	0.3693	0.1400	-0.0040	0.1069	0.3044	-0.0677	0.2515
APPLE--2	1.0000	-0.2854	0.2213	-0.1827	0.0426	0.1699	-0.1712	-0.2491	0.1864	-0.2431
APPLE--3	-0.2854	1.0000	0.1755	0.3498	-0.0974	0.2231	0.4899	0.3872	0.0421	0.3017
APPLE--5	0.2213	0.1755	1.0000	-0.0659	-0.2501	-0.0211	-0.0961	-0.0734	-0.0626	-0.0609
APPLE--6	-0.1827	0.3498	-0.0659	1.0000	-0.3615	0.0157	0.1153	0.2976	-0.3116	0.3239
APPLE--7	0.0426	-0.0974	-0.2501	-0.3615	1.0000	0.2047	-0.0432	-0.1091	0.3270	-0.0776
APPLE--8	0.1699	0.2231	-0.0211	0.0157	0.2047	1.0000	0.2905	0.0296	0.0912	-0.1267
APPLE--9	-0.1712	0.4899	-0.0961	0.1153	-0.0432	0.2905	1.0000	0.3065	-0.1919	0.1319
APPLE-10	-0.2491	0.3872	-0.0734	0.2976	-0.1091	0.0296	0.3065	1.0000	-0.0292	0.3414
APPLE-11	0.1864	0.0421	-0.0626	-0.3116	0.3270	0.0912	-0.1919	-0.0292	1.0000	-0.2147
APPLE-12	-0.2431	0.3017	-0.0609	0.3239	-0.0776	-0.1267	0.1319	0.3414	-0.2147	1.0000
APPLE-13	0.2709	0.0132	-0.0859	-0.1305	0.0637	0.1572	0.0810	0.0798	0.0950	0.0509
APPLE-14	0.3235	0.0096	-0.0165	0.0475	0.0824	0.2493	0.1561	0.2195	0.1402	-0.1619
TCH--SEX	-0.2701	0.0572	0.1707	0.2343	-0.3233	-0.3301	0.1755	0.1736	-0.5865	0.2438
TCH--AGE	-0.3165	0.3296	-0.1678	0.2790	0.1865	0.3523	0.2577	0.4370	-0.1167	0.3106
T-YRSSCH	-0.2414	0.1397	0.1283	0.5366	-0.2292	0.1265	0.0749	0.2376	-0.3718	-0.0664
T-YRSTCH	-0.1978	0.1792	-0.1848	0.1856	-0.0348	0.3444	0.3023	0.3741	-0.2109	0.0585
T-HD.LEV	-0.0762	-0.2029	-0.1874	0.0562	0.0907	-0.1860	-0.2643	-0.0934	-0.0623	-0.0466
EX-F & A	-0.1333	-0.0127	-0.0710	-0.1806	0.2843	-0.0970	-0.0730	-0.0671	0.2656	0.0183
DIS.FUND	0.1174	-0.1379	-0.2497	-0.1751	0.5127	0.0713	-0.1766	-0.0725	0.3346	-0.0751
PRIN-CHG	-0.0197	-0.1677	0.0474	-0.0962	0.2355	-0.2060	-0.1885	-0.2461	0.3628	-0.0578

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Final Structural Analysis
Grade 2 Reading (continued)

CORRELATIONS

	APPLE--2	APPLE--3	APPLE--5	APPLE--6	APPLE--7	APPLE--8	APPLE--9	APPLE-10	APPLE-11	APPLE-12
INS.COMP	0.0662	-0.2047	0.1243	-0.3226	-0.0466	-0.0669	0.0552	-0.0783	0.1677	-0.0368
TEAMING	0.2479	0.0031	-0.1307	-0.0809	0.1473	0.0022	-0.1059	-0.1528	-0.0122	-0.1709
CURCENUS	0.1806	-0.0216	0.0964	-0.0950	-0.0644	-0.0558	0.1415	-0.0760	-0.2364	-0.0592
CENTRALD	-0.0036	0.1525	-0.1996	-0.0061	0.1195	0.1669	0.1177	0.2277	-0.0323	0.0601
PRINHELP	-0.0907	-0.0752	0.2154	0.1200	-0.2211	-0.1747	-0.0376	0.1175	-0.1519	-0.0034
S. STYLE	-0.2458	-0.1412	0.0602	-0.0618	-0.1452	-0.0124	0.0057	0.0374	0.0781	0.0730
P. STYLE	-0.1438	-0.2712	-0.0360	-0.2598	0.1693	0.2224	0.0136	-0.0688	0.1786	-0.1536
PSTYLE-T	-0.1723	0.2252	-0.2779	0.2744	0.1181	0.1668	0.1624	0.1918	-0.1194	0.3229
CLASS CL	-0.0369	-0.2613	-0.1633	-0.0488	0.1600	-0.2612	-0.2239	-0.0238	0.0617	0.2109
ASPIRAT.	-0.0648	0.0710	-0.2405	-0.1021	0.4706	0.1385	0.0595	-0.0438	0.0409	0.1704
SATISFCT	-0.2679	0.0329	-0.3766	0.2567	0.0104	-0.0276	0.1527	0.1112	0.0576	0.3338
T.P.STUD	-0.1079	-0.2589	-0.0070	-0.1311	-0.2229	-0.1627	0.1812	0.1568	-0.5143	0.0745
TEACH.KN	0.0822	0.0492	0.1425	-0.3149	0.0431	-0.0805	-0.1267	-0.1312	0.2773	-0.1437
SUBJECTK	0.1750	-0.0410	0.0999	0.2521	-0.3228	0.0560	-0.2350	-0.0309	0.0045	0.1411
VERB.FL.	0.0530	-0.0928	-0.0100	0.0462	0.0113	-0.2267	-0.2450	-0.2734	-0.1102	0.1726
MEMORY	0.2851	-0.1479	0.0825	-0.2653	0.1464	0.0248	-0.1113	-0.2587	-0.0025	0.0463
REASONNG	0.0687	-0.0969	-0.0466	-0.1389	-0.1297	-0.0978	0.0099	-0.1272	-0.0273	0.0409
FLEXIBLE	0.2061	-0.3625	-0.1240	-0.1534	-0.0862	-0.2922	-0.2642	-0.3069	-0.0069	-0.0528
T COGSTY	0.2209	-0.3306	-0.0178	-0.0556	-0.0391	-0.0648	-0.4377	-0.4159	-0.0043	-0.2239
SPTAA	0.1604	-0.0667	-0.0722	-0.0336	-0.1852	-0.2276	0.1253	0.0227	-0.2004	0.1816
S COGSTY	0.0679	-0.0834	-0.0084	0.0418	-0.0121	-0.0937	0.0092	-0.0783	-0.1550	0.0765
S-ATT.-F	-0.1274	0.3497	-0.1301	0.0935	0.2868	0.3383	0.3372	0.0854	-0.0178	0.1676
S-ATT.-S	-0.3510	0.1975	-0.2061	0.1453	0.2245	0.0571	0.0238	0.0734	0.1826	0.0936
S-EXP.-F	0.1913	0.0211	-0.2020	0.1109	-0.1018	0.0337	0.1386	0.0124	-0.1065	0.0985
S-EXP.-S	0.0462	-0.0346	-0.2133	0.1136	-0.2029	-0.2358	0.0739	0.0088	-0.3020	0.0393
CAT RCMP	-0.2143	-0.0624	0.1597	0.2063	0.0542	-0.3136	-0.1467	-0.0642	0.0112	0.0915
READ APP	-0.1302	0.0829	-0.0723	0.0933	0.1113	-0.0440	0.0466	-0.1630	-0.1007	0.1612
RECOGING	-0.2139	0.1057	-0.1144	-0.0143	0.4044	0.0974	0.0785	0.1268	0.1314	0.2786
READ ACH	-0.1173	-0.1344	-0.0256	-0.0185	0.0712	-0.0894	0.1728	0.0362	-0.0436	0.0590
IQT READ	-0.2446	-0.0073	0.0177	0.2182	0.1091	-0.1468	0.0077	-0.0658	-0.0631	0.2032
PSEUDO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Final Structural Analysis
Grade 2 Reading (continued)

CORRELATIONS

	APPLE-13	APPLE-14	TCH--SEX	TCH--AGE	T-YRSSCH	T-YRSTCH	T-ED.LEV	EX-T & A	DIS.FUND	PRIN-CHG
WD-----1	0.1537	0.0484	-0.0581	0.0961	-0.2623	0.0183	0.1476	0.3040	0.1157	-0.0033
WD-----2	0.3979	-0.1207	0.0564	-0.0839	-0.0328	-0.2288	-0.1294	-0.0477	-0.0053	0.1490
WD-----3	0.0414	-0.1211	0.0650	-0.0393	-0.1347	0.0085	-0.0193	-0.0092	0.0000	0.1434
WD-----4	0.2009	-0.0202	-0.3614	-0.1632	-0.2840	-0.0973	0.1913	-0.2660	0.3079	0.1776
WD-----5	0.2751	-0.2830	0.1206	-0.1793	-0.2191	-0.1488	0.0264	-0.1046	0.0503	0.0669
RAMOS--1	0.0286	-0.0764	-0.1057	-0.0365	-0.0280	0.0389	-0.2277	-0.4221	0.1201	0.0519
RAMOS--2	0.0981	-0.0744	-0.2865	0.1167	-0.0494	0.0356	-0.2445	-0.3265	0.1866	0.0056
RAMOS--3	0.1328	-0.0868	0.0553	0.1514	0.0647	-0.0420	-0.1735	-0.2071	0.0814	0.0963
RAMOS--4	0.1107	0.0957	-0.0746	0.2326	0.0414	0.0424	-0.1570	-0.1338	0.0687	0.0814
APPLE--1	-0.0150	0.1391	-0.0162	0.3765	0.1847	0.2451	0.1718	0.1535	0.3166	0.0505
APPLE--2	0.2709	0.3235	-0.2761	-0.3165	-0.2414	-0.1978	-0.0762	-0.1333	0.1174	-0.0157
APPLE--3	0.0132	0.0096	0.0672	0.3296	0.1397	0.1792	-0.2029	-0.0127	-0.1379	-0.1677
APPLE--5	-0.0859	-0.0165	0.1707	-0.1678	0.1283	-0.1848	-0.1874	-0.0710	-0.2457	0.0474
APPLE--6	-0.1305	0.0475	0.2343	0.2790	0.5366	0.1856	0.0562	-0.1806	-0.1751	-0.0962
APPLE--7	0.6374	0.0824	-0.3233	0.1665	-0.2292	-0.0348	0.0907	0.2843	0.5127	0.2355
APPLE--8	0.1572	0.2493	-0.3301	0.3523	0.1265	0.3444	-0.1860	-0.0970	0.0713	-0.2003
APPLE--9	0.0810	0.1561	0.1755	0.2577	0.0749	0.3023	-0.2643	-0.0730	-0.1766	-0.1865
APPLE-10	0.0798	0.2195	0.1736	0.4370	0.2376	0.3741	-0.0934	-0.0671	-0.0725	-0.2461
APPLE-11	0.0950	0.1402	-0.5865	-0.1187	-0.3718	-0.2109	-0.0623	0.2656	0.3366	0.3628
APPLE-12	0.0969	-0.1619	0.2438	0.3108	-0.0864	0.0585	-0.0486	0.0186	-0.0751	-0.0578
APPLE-13	1.0000	0.0906	-0.0449	0.2426	-0.1875	0.0263	-0.0863	0.1394	0.4171	-0.0211
APPLE-14	0.0906	1.0000	-0.0179	0.0970	0.0644	0.2448	-0.1516	-0.0504	-0.0491	-0.1693
TCH--SEX	-0.0449	-0.0179	1.0000	0.1391	0.3548	0.2167	0.1550	-0.0713	-0.3478	-0.1977
TCH--AGE	0.2426	0.0970	0.1391	1.0000	0.4337	0.6996	0.0333	0.0971	0.1400	-0.1615
T-YRSSCH	-0.1875	0.0644	0.3548	0.4337	1.0000	0.3972	0.1790	-0.1145	-0.1866	-0.2605
T-YRSTCH	0.0263	0.2448	0.2167	0.6996	0.3972	1.0000	0.0952	-0.0291	-0.0576	-0.4007
T-ED.LEV	-0.0863	-0.1516	0.1550	0.0333	0.1790	0.0952	1.0000	-0.0454	-0.0084	-0.1395
EX-T & A	0.1394	-0.0504	-0.0713	0.0971	-0.1145	-0.0291	-0.0454	1.0000	0.1408	0.1251
DIS.FUND	0.4171	-0.0491	-0.3478	0.1400	-0.1866	-0.0576	-0.0084	0.1408	1.0000	0.3382
PRIN-CHG	-0.0211	-0.1693	-0.1977	-0.1615	-0.2605	-0.4007	-0.1395	0.1251	0.3382	1.0000

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Final Structural Analysis
Grade 2 Reading (continued)

CORRELATIONS

	APPLE-13	APPLE-14	TCH--SEX	TCH--AGE	T-YRSSCH	T-YRSTCH	T-ED.LEV	EX-T & A	DIS.FUND	PRIN-CHG
INS.COMP	-0.2378	0.0507	-0.2468	-0.2145	-0.2316	-0.1467	-0.1810	0.2333	0.0520	0.3523
TEAMING	0.1482	-0.0571	-0.2710	-0.0813	-0.1552	-0.0153	-0.2670	0.2778	0.4077	0.2311
CONSENSUS	0.0310	0.1581	0.2480	0.0597	0.0208	0.1682	0.1141	-0.1396	-0.2851	-0.5552
CENTRALD	0.3674	-0.0028	0.1213	0.3759	0.1375	0.3144	-0.0862	-0.1311	0.2850	-0.2148
PRINHELP	-0.1583	0.1556	0.2186	-0.2402	0.0815	-0.2077	-0.2411	-0.0731	-0.1923	0.0023
S. STYLE	-0.2063	-0.0942	0.0306	0.1224	0.0102	-0.0058	-0.1280	0.2298	-0.2548	0.5650
P. STYLE	0.1068	-0.1102	-0.2714	0.1792	0.0138	0.0059	-0.1156	0.1802	0.1630	0.2535
PSTYLE-T	0.3903	-0.1413	0.0649	0.5382	0.0336	0.4213	0.1574	0.1417	0.2355	-0.3000
CLASS CL	0.0617	-0.2260	-0.0223	0.0548	-0.1122	0.0018	0.5832	0.1369	0.1394	0.0969
ASPIRAT.	0.2562	-0.1554	-0.0195	0.1536	-0.2651	0.1168	0.2354	-0.1456	0.2541	0.0832
SATISFCT	0.0934	-0.1770	-0.0532	0.2041	0.0695	0.1928	0.2206	-0.1284	0.2349	-0.1521
T.P.STUD	-0.0216	-0.1428	0.2341	-0.0878	0.0009	0.2325	0.1384	-0.1418	-0.3112	-0.3348
TEACH.KN	-0.0379	-0.0398	0.0492	-0.0425	-0.2156	0.2357	0.1658	0.3954	0.0066	-0.0022
SUBJECTK	-0.1883	0.0067	-0.1944	-0.2430	-0.0218	-0.3762	-0.1970	-0.0296	-0.0375	-0.0550
VERB.FL.	0.0788	-0.2785	-0.1030	-0.2603	-0.2923	-0.3183	-0.0592	0.3077	-0.0100	0.1265
MEMORY	-0.1116	0.1191	-0.0490	-0.3775	-0.3881	-0.3677	-0.2013	0.2591	0.1256	0.2649
REASONNG	-0.2330	-0.0630	-0.3316	-0.3439	-0.2769	-0.3258	-0.0866	0.0625	0.0712	0.0359
FLEXIBLE	-0.1410	-0.1151	-0.1800	-0.5014	-0.3114	-0.4699	0.0206	0.2735	0.0504	0.1035
T COGSTY	-0.1720	-0.0772	-0.2724	-0.5139	-0.1471	-0.4705	0.0504	0.1027	-0.0668	0.1322
SFIAA	-0.0001	-0.1175	-0.0463	-0.0422	-0.0024	-0.0195	-0.0413	-0.0285	-0.0408	-0.1041
S COGSTY	-0.0950	-0.0521	-0.1052	-0.2046	-0.0124	-0.2026	-0.0035	-0.0394	-0.1143	-0.1197
S-ATT.-F	0.2253	0.2654	0.1252	0.3502	-0.0707	0.3218	-0.0211	0.2534	0.1393	-0.1306
S-ATT.-S	-0.0306	0.1908	0.0453	0.3074	0.0046	0.2048	-0.0868	0.2644	0.2056	0.0547
S-EXP.-F	0.1086	0.0386	-0.0581	-0.0543	-0.0704	-0.0120	0.1059	-0.1172	-0.2010	-0.5101
S-EXP.-S	0.0351	-0.1184	0.1716	-0.0923	-0.0191	0.1161	0.1557	-0.2744	-0.0997	-0.2797
CAT RCMP	-0.1043	-0.1566	0.2349	-0.2808	0.1611	-0.1321	0.0547	0.1941	-0.2000	0.2177
READ APP	0.0482	-0.0109	0.1125	0.1732	0.0935	0.0679	-0.1126	0.3796	0.0727	0.2316
DECODING	0.1489	0.1012	0.0552	0.3803	0.0483	0.0559	-0.0113	0.3530	0.2378	0.3211
READ ACH	-0.1677	0.0901	0.1879	0.0773	0.0996	-0.0285	-0.1072	0.0619	0.0110	0.3700
TOT READ	-0.0110	-0.0530	0.2401	0.1027	0.1691	0.0719	-0.0356	0.3771	-0.0353	0.3307
PSEUDO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Final Structural Analysis
Grade 2 Reading (continued)

CORRELATIONS

	INS.COMP	TEAMING	CONCENUS	CENTRALD	PRINHELP	S. STYLE	P. STYLE	PSTYLE-T	CLASS CL	ASPIRAT.
WD-----1	0.0352	-0.1247	0.1473	0.1579	-0.0633	-0.0327	-0.1275	0.0334	0.1953	0.1363
WD-----2	-0.0130	0.0399	-0.2610	0.1385	-0.1920	0.1915	0.1698	0.0667	0.0419	0.0273
WD-----3	0.2318	-0.0609	-0.0500	-0.1470	-0.0113	0.2790	0.1494	-0.0802	0.3031	0.0627
WD-----4	0.1394	0.0783	0.0243	0.0282	-0.2613	-0.0337	0.0745	-0.2116	0.1916	0.4146
WD-----5	0.2093	-0.0413	0.1057	0.0754	0.0698	-0.0198	0.0659	-0.1989	0.2366	0.1311
RAMOS--1	0.0131	0.0661	-0.0290	0.0421	0.0204	-0.1078	0.0002	-0.1038	-0.2221	0.0024
RAMOS--2	-0.0444	0.0766	-0.1997	0.0522	-0.0641	-0.1649	-0.0345	0.2200	-0.0248	0.1031
RAMOS--3	-0.3226	-0.1487	-0.0860	0.0198	-0.0522	-0.1247	-0.2645	0.2305	-0.0750	0.1129
RAMOS--4	-0.4171	-0.1691	0.0174	0.0077	-0.0548	-0.0887	-0.1665	0.1116	-0.0637	-0.0090
APPLE--1	0.0662	-0.1255	-0.0894	-0.0273	-0.0239	0.1506	0.1410	0.1611	0.2700	0.0175
APPLE--2	0.0662	0.2479	0.1806	-0.0036	-0.0907	-0.2458	-0.1438	-0.1723	-0.0369	-0.0648
APPLE--3	-0.2047	0.0031	-0.0216	0.1525	-0.0752	-0.1412	-0.2712	0.2252	-0.2613	0.0710
APPLE--5	0.1243	-0.1307	0.0964	-0.1996	0.2154	0.0602	-0.0360	-0.2779	-0.1633	-0.2405
APPLE--6	-0.3226	-0.0809	-0.0950	-0.0061	0.1200	-0.0618	-0.2558	0.2744	-0.0488	-0.1021
APPLE--7	-0.0466	0.1473	-0.0644	0.1195	-0.2211	-0.1452	0.1693	0.1181	0.1600	0.4706
APPLE--8	-0.0669	0.0022	-0.0558	0.1669	-0.1747	-0.0124	0.2224	0.1668	-0.2612	0.1365
APPLE--9	0.0552	-0.1099	0.1415	0.1177	-0.0376	0.0057	0.0136	0.1624	-0.2239	0.0595
APPLE-10	-0.0783	-0.1528	-0.0760	0.2277	0.1175	0.0374	-0.0888	0.1918	-0.0238	-0.0438
APPLE-11	0.1677	-0.0122	-0.2364	-0.0323	-0.1519	0.0781	0.1786	-0.1194	0.0617	0.0409
APPLE-12	-0.0368	-0.1709	-0.0592	0.0601	-0.0054	0.0730	-0.1536	0.3229	0.2109	0.1704
APPLE-13	-0.2378	0.1482	0.0310	0.3674	-0.1583	-0.2063	0.1068	0.3903	0.0817	0.2562
APPLE-14	0.0507	-0.0571	0.1581	-0.0028	0.1556	-0.0942	-0.1102	-0.1413	-0.2260	-0.1554
TCH--SEX	-0.2468	-0.2710	0.2480	0.1213	0.2186	0.0306	-0.2714	0.0649	-0.0223	-0.0195
TCH--AGE	-0.2145	-0.0813	0.0597	0.3759	-0.2402	0.1224	0.1792	0.5382	0.0548	0.1536
T-YRSSCH	-0.2316	-0.1552	0.0208	0.1375	0.0815	0.0102	0.0138	0.0336	-0.1122	-0.2651
T-YRSTCH	-0.1467	-0.0153	0.1682	0.3144	-0.2077	-0.0058	0.0059	0.4213	0.0018	0.1168
T-ED.LEV	-0.1810	-0.2870	0.1141	-0.0862	-0.2411	-0.1260	-0.1156	0.1574	0.5832	0.2354
EX-T & A	0.2333	0.2778	-0.1396	-0.1311	-0.0731	0.2298	0.1802	0.1417	0.1369	-0.1436
DIS.FUND	0.0520	0.4077	-0.2851	0.2690	-0.1923	-0.2548	0.1630	0.2355	0.1394	0.2541
PRIN-CHG	0.3523	0.2311	-0.5532	-0.2148	0.0023	0.5850	0.2535	-0.3000	0.0969	0.0832

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Final Structural Analysis
Grade 2 Reading (continued)

CORRELATIONS

	INS.COMP	TEAMING	CONCENUS	CENTRALD	PRIMHELP	S. STYLE	P. STYLE	PSTYLE-T	CLASS CL	ASPIRAT.
INS.COMP	1.0000	0.2288	-0.2209	-0.5204	0.1661	0.4009	0.3194	-0.4218	0.1281	-0.0055
TEAMING	0.2288	1.0000	-0.0584	0.0219	-0.1348	-0.2180	0.0073	0.1002	-0.2549	0.0259
CONCENSUS	-0.2209	-0.0584	1.0000	0.0674	0.1430	-0.5755	-0.2590	-0.1922	-0.3043	-0.0144
CENTRALD	-0.5204	0.0219	0.0674	1.0000	-0.2742	-0.1957	-0.1106	0.4141	-0.0908	0.1181
PRIMHELP	0.1661	-0.1348	0.1430	-0.2742	1.0000	-0.0419	-0.0502	-0.4249	-0.2153	-0.2144
S. STYLE	0.4009	-0.2180	-0.5755	-0.1957	-0.0419	1.0000	0.5719	-0.1414	0.1849	-0.0137
P. STYLE	0.3194	0.0073	-0.2590	-0.1106	-0.0502	0.5719	1.0000	-0.1396	-0.0744	-0.1992
PSTYLE-T	-0.4218	0.1002	-0.1922	0.4141	-0.4249	-0.1414	-0.1396	1.0000	0.2816	0.2735
CLASS CL	0.1281	-0.2549	-0.3043	-0.0908	-0.2153	0.1849	-0.0744	0.2816	1.0000	0.3589
ASPIRAT.	-0.0055	0.0259	-0.0144	0.1181	-0.2144	-0.0137	-0.1992	0.2735	0.3589	1.0000
S-TISPCT	-0.2481	-0.2546	-0.2928	0.0413	-0.3055	0.0163	-0.0746	0.5874	0.6074	0.2331
T.P.STUD	0.1825	-0.1373	0.1903	0.0047	0.1479	0.0955	0.1087	0.0311	0.2479	0.1324
TEACH.KN	0.1010	0.1062	-0.0004	-0.1264	-0.3201	-0.0120	0.0208	0.0999	0.1238	-0.0191
SUBJECTK	0.0687	-0.0766	-0.0902	-0.3076	0.2147	-0.1653	-0.0546	-0.1099	-0.1305	-0.3655
VERB.FL.	0.2058	0.1891	-0.0659	-0.1025	0.1362	0.0060	-0.0175	-0.0031	0.2317	-0.0194
MEMORY	0.3477	0.3237	-0.0158	-0.2279	0.0936	0.0459	-0.0527	-0.3007	-0.1100	0.0734
REASONING	0.4637	0.2297	-0.2493	-0.3543	0.0546	0.0231	0.0633	-0.0937	0.0598	-0.0680
FLEXIBLE	0.2952	0.2420	-0.0177	-0.0763	0.1436	-0.0594	0.1867	-0.3169	0.0651	-0.3520
T COGSTY	0.0561	0.1508	0.0195	-0.2690	0.2354	0.0038	0.0617	-0.3904	-0.0988	-0.1397
S-ATT.-F	0.0834	0.0686	0.0839	0.2570	-0.0632	-0.0721	0.0522	-0.0193	0.3823	-0.1181
S COGSTY	0.0388	0.0060	0.1397	0.1568	0.0673	-0.1562	-0.0640	-0.1763	0.2476	-0.0664
S-ATT.-S	-0.0739	0.0600	0.0913	0.0714	-0.0788	-0.0416	-0.0208	0.2194	-0.1215	0.2637
S-EXP.-F	-0.0446	0.0485	-0.0632	-0.0701	0.0021	-0.0049	-0.0346	0.1434	-0.2186	0.0926
S-EXP.-S	-0.3292	-0.2049	0.2854	0.2233	0.0137	-0.3645	-0.2489	0.2607	0.2720	-0.0302
CAT RCMP	-0.2293	-0.1143	0.3131	0.3210	0.0882	-0.2629	-0.2611	-0.0056	0.1727	0.0576
READ APP	0.0138	-0.1830	-0.0334	-0.1652	0.3181	0.1075	-0.1107	-0.3822	0.0118	0.0346
DECODING	0.1174	0.2004	-0.1204	-0.0508	-0.1630	0.0487	-0.3658	0.2749	0.0358	0.0079
READ ACH	0.0190	-0.0631	-0.0532	0.0020	-0.0556	0.2714	-0.0471	0.0565	0.0330	0.2617
TOT READ	0.3293	-0.0530	-0.0027	-0.0930	0.0529	0.2136	-0.0753	-0.2151	-0.0408	0.0613
PSEUDO	0.1681	-0.0566	-0.2103	-0.1562	0.0261	0.1926	-0.3166	0.0912	0.1010	0.1396
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Final Structural Analysis
Grade 2 Reading (continued)

CORRELATIONS

	SATISFCT	T.P.STUD	TEACH.KN	SUBJECTK	VERB.FL.	MEMORY	REASONNG	FLEXIBLE	T COGSTY	SPTAA
RD-----1	0.0045	-0.0897	0.3398	-0.3082	0.0383	-0.0388	-0.2505	-0.0729	-0.1320	-0.1736
RC-----2	-0.0016	-0.0144	0.0180	-0.1088	0.0760	-0.0934	-0.1311	-0.0446	-0.1092	0.0080
RJ-----3	0.2120	0.3173	-0.0316	-0.2995	0.0631	0.0981	0.0628	0.0062	-0.0704	0.0662
RD-----4	0.0387	-0.0111	0.0937	-0.2854	-0.3113	-0.0425	-0.0357	-0.1854	-0.2149	-0.0501
RD-----5	0.0209	0.4552	-0.1144	-0.1498	0.2093	0.0349	-0.0084	0.1499	-0.1521	0.2010
RAMOS--1	-0.1044	-0.0058	0.1540	-0.1124	-0.1186	-0.0861	-0.1607	-0.1541	-0.2767	-0.0791
RAMOS--2	0.0498	-0.0333	0.0559	0.0284	-0.0562	0.0666	0.0507	-0.1127	-0.2789	-0.0696
RAMOS--3	0.1791	-0.3462	-0.0766	0.0636	-0.1366	0.0510	-0.2070	-0.2440	-0.2266	-0.1328
RAMOS--4	0.0468	-0.2147	-0.0190	-0.0520	-0.1826	-0.0156	-0.2921	-0.1424	-0.1338	-0.0895
APPLE--1	0.3552	0.0593	-0.1609	0.0742	0.0669	-0.0180	0.1063	0.0224	-0.0457	0.0770
APPLE--2	-0.2679	-0.1079	0.0822	0.1750	0.0530	0.2851	0.0687	0.2061	0.2209	0.1634
APPLE--3	0.0329	-0.2589	0.0492	-0.0410	-0.0928	-0.1479	-0.0969	-0.3625	-0.3306	-0.0667
APPLE--4	-0.3766	-0.0070	0.1425	0.0999	-0.0100	0.0825	-0.0466	-0.1240	-0.0178	-0.0722
APPLE--5	0.2567	-0.1311	-0.3149	0.2521	0.0462	-0.2653	-0.1389	-0.1534	-0.0556	-0.0336
APPLE--6	0.0104	-0.2229	0.0431	-0.3228	0.0113	0.1464	-0.1297	-0.0462	-0.0391	-0.1652
APPLE--7	-0.0276	-0.1627	-0.0605	0.0560	-0.2267	0.0246	-0.0978	-0.2922	-0.0648	-0.2276
APPLE--8	0.1527	0.1812	-0.1267	-0.2350	-0.2450	-0.1113	0.0099	-0.2642	-0.4377	0.1253
APPLE--9	0.1112	0.1368	-0.1312	-0.0309	-0.2734	-0.2387	-0.1272	-0.3069	-0.4159	0.0227
APPLE-10	0.0576	-0.5143	0.2773	0.0045	-0.1102	-0.0025	-0.0273	-0.0069	-0.0043	-0.2004
APPLE-11	0.3388	0.0745	-0.1437	0.1411	0.1726	0.0483	0.0409	-0.0528	-0.2239	0.1816
APPLE-12	0.0934	-0.0216	-0.0379	-0.1883	0.0788	-0.1116	-0.2330	-0.1410	-0.1720	-0.0001
APPLE-13	-0.1770	-0.1428	-0.0398	0.0567	-0.2785	0.1191	-0.0630	-0.1151	-0.0772	-0.1175
APPLE-14	-0.0532	0.2341	0.0492	-0.1944	-0.1030	-0.0490	-0.3316	-0.1800	-0.2724	-0.0463
TCH--SEX	0.2041	-0.0878	-0.0425	-0.2430	-0.2603	-0.3775	-0.4439	-0.5014	-0.5139	-0.0422
TCH--AGE	0.0095	0.0009	-0.2156	-0.0218	-0.2723	-0.3881	-0.2769	-0.3114	-0.1471	-0.0024
T-YASSCH	0.1928	0.2325	0.2357	-0.3762	-0.3183	-0.3677	-0.3258	-0.4699	-0.4705	-0.0195
T-Y-STCH	0.2206	0.1384	0.1658	-0.1970	-0.0592	-0.2013	-0.0886	0.0206	0.0504	-0.0413
T-ED.LEV	-0.1284	-0.1418	0.3954	-0.0296	0.3077	0.2591	0.0625	0.2735	0.1027	-0.0265
EA-T & A	0.2349	-0.3112	0.0068	-0.0375	-0.0100	0.1256	0.0712	0.0504	-0.0668	-0.0408
CIS.FUND	-0.1521	-0.3348	-0.0022	-0.0530	0.1265	0.2699	0.0359	0.1035	0.1322	-0.1041
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Final Structural Analysis
Grade 2 Reading (continued)

CORRELATIONS

	SATISFCT	T.P.STUD	TEACH.KN	SUBJECTK	VERB.FL.	MEMORY	REASONNG	FLEXIBLE	T COGSTY	SFTAA
IDS.COMP	-0.2481	0.1825	0.1010	0.0687	0.2058	0.3477	0.4637	0.2952	0.0581	0.0834
TEAMING	-0.2546	-0.1373	0.1062	-0.0766	0.1891	0.3237	0.2297	0.2420	0.1508	0.0686
CONSENUS	-0.2928	0.1903	-0.0004	-0.0902	-0.0659	-0.0158	-0.2493	-0.0177	0.0195	0.0859
CENTRALD	0.3413	0.0047	-0.1264	-0.3076	-0.1025	-0.2279	-0.3543	-0.3763	-0.2650	0.2370
PRINHELP	-0.3055	0.1479	-0.3201	0.2147	0.1362	0.0936	0.0546	0.1436	0.2354	-0.0632
S. STYLE	0.0163	0.0955	-0.0120	-0.1653	0.0060	0.0459	0.0231	-0.0594	0.0038	-0.0721
P. STYLE	-0.0746	0.1087	0.0208	-0.0546	-0.0175	-0.0527	0.0633	0.1887	0.0617	0.0522
PSTYLE-T	0.5674	0.0311	0.0999	-0.1099	-0.0031	-0.3007	-0.0937	-0.3169	-0.3904	-0.0133
CLASS CL	0.6074	0.2479	0.1238	-0.1305	0.2317	-0.1100	0.0598	0.0051	-0.0588	0.0623
ASPIRAT.	0.2331	0.1324	-0.0191	-0.3655	-0.0194	0.0734	-0.0660	-0.3320	-0.1547	-0.1161
SATISFCT	1.0000	0.1293	-0.1473	-0.1760	-0.1427	-0.4173	-0.0240	-0.2594	-0.3662	0.2564
T.P.STUD	0.1293	1.0000	-0.0507	-0.1156	0.2143	-0.0263	0.3371	0.1375	-0.0193	0.4858
TEACH.KN	-0.1473	-0.0507	1.0000	-0.2120	0.0655	0.2068	-0.0684	0.1264	-0.1615	-0.1073
SUBJECTK	-0.1760	-0.1156	-0.2120	1.0000	0.3752	0.2584	0.4988	0.4790	0.3936	0.1197
VERB.FL.	-0.1427	0.2143	0.0655	0.3752	1.0000	0.4488	0.4828	0.6820	0.5405	0.3577
MEMORY	-0.4173	-0.0263	0.2068	0.2584	0.4488	1.0000	0.4465	0.5737	0.3738	-0.0214
REASONNG	-0.0240	0.3371	-0.0684	0.4988	0.4828	0.4465	1.0000	0.6341	0.4280	0.2454
FLEXIBLE	-0.2594	0.1375	0.1264	0.4790	0.6820	0.5737	0.6341	1.0000	0.6086	0.2599
T COGSTY	-0.3662	-0.0193	-0.1615	0.3936	0.5405	0.3738	0.4280	0.6086	1.0000	0.0860
SFTAA	0.2564	0.4858	-0.1073	0.1197	0.3577	-0.0214	0.2454	0.2599	0.0860	1.0000
S COGSTY	0.1460	0.2887	-0.3583	0.0394	0.3829	0.1273	0.2079	0.2126	0.4233	0.5798
S-ATT.-F	-0.0045	-0.2731	0.1466	-0.1170	-0.0163	0.0884	-0.1548	-0.1221	-0.1793	-0.2422
S-ATT.-S	0.0237	-0.5114	0.1258	-0.1360	-0.2589	-0.0806	-0.2464	-0.2081	-0.2583	-0.5452
S-EXP.-F	0.3582	0.3088	-0.2626	0.1686	0.2272	-0.1987	0.1186	0.0971	0.2600	0.0039
S-EXP.-S	0.2029	0.5070	-0.2835	-0.0581	0.1568	-0.2718	0.0336	0.0494	0.1252	0.5087
CAT RCMP	-0.1210	0.0071	0.0129	0.0403	0.1748	0.0381	-0.0994	-0.0128	0.1406	-0.0190
READ APP	0.1021	-0.2634	0.0860	0.0362	0.0747	0.1194	-0.0340	-0.1607	-0.1482	-0.1997
DECODING	0.0659	-0.3686	0.0287	-0.1089	-0.1465	0.2446	-0.1880	-0.1922	-0.1780	-0.3270
READ ACH	-0.0064	-0.0209	-0.0767	-0.1386	-0.3306	0.0083	-0.2060	-0.2168	-0.3747	-0.1600
TOT READ	0.1562	-0.1424	0.0516	0.0003	0.0424	-0.0325	-0.1407	-0.2431	-0.1830	-0.2059
PSEUDO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Final Structural Analysis
Grade 2 Reading (continued)

CORRELATIONS

	S CCGSTY	S-ATT.-F	S-ATT.-S	S-EXP.-F	S-EXP.-S	CAT REMP	READ APP	DECODING	READ ACH	TOT READ
WD-----1	-0.0644	-0.0602	0.0796	0.0214	-0.0026	-0.1571	-0.0422	0.1051	-0.0365	-0.0711
WD-----2	-0.1636	-0.0901	-0.1210	-0.1780	-0.1132	-0.0770	0.1225	-0.0976	0.0482	0.0594
WD-----3	0.1062	-0.1510	-0.1977	-0.0897	-0.2160	-0.0017	0.0913	0.0707	-0.0632	0.0827
WD-----4	-0.0078	-0.0216	-0.0329	-0.1764	0.0240	-0.0609	-0.2473	0.0769	0.0935	-0.2671
WD-----5	0.2147	-0.1813	-0.3736	0.0883	0.2886	0.0895	-0.1589	-0.2507	0.1445	-0.0141
RAMOS--1	-0.3452	-0.1195	-0.1516	-0.2535	-0.2347	-0.2524	-0.1140	-0.2414	-0.1054	-0.1901
RAMOS--2	-0.1576	-0.1122	-0.1350	-0.1055	-0.2289	-0.3642	0.0088	-0.0418	-0.0830	-0.1626
RAMOS--3	-0.1551	0.0002	0.0154	-0.0746	-0.2570	0.0430	0.3035	0.2972	-0.0027	0.1529
RAMOS--4	-0.1040	-0.0370	0.1122	0.0630	-0.0984	-0.1696	0.2149	0.3233	0.1086	0.0967
APPLE--1	0.0894	0.2128	0.2440	-0.0089	0.0170	0.0749	0.1428	0.3599	0.0937	0.2244
APPLE--2	0.0679	-0.1274	-0.3510	0.1913	0.0462	-0.2143	-0.1382	-0.2139	-0.1173	-0.2448
APPLE--3	-0.0854	0.3497	0.1975	0.0211	-0.0346	-0.0424	0.0629	0.1057	-0.1344	-0.0073
APPLE--4	-0.0084	-0.1301	-0.2061	-0.2020	-0.2133	0.1597	-0.0723	-0.1144	-0.0256	0.0177
APPLE--5	0.0418	0.0935	0.1453	0.1109	0.1136	0.2063	0.0933	-0.0143	-0.0165	0.2162
APPLE--6	-0.0121	0.2868	0.2245	-0.1073	-0.2029	0.0542	0.1113	0.4644	0.0712	0.1691
APPLE--7	-0.0657	0.3383	0.0571	0.0357	-0.2358	-0.3136	-0.0440	0.0974	-0.0894	-0.1468
APPLE--8	0.0092	0.3372	0.0238	0.1386	0.0739	-0.1467	0.0466	0.0765	0.1728	0.0077
APPLE--9	-0.0783	0.0854	0.0734	0.0124	0.0088	-0.3642	-0.1630	0.1268	0.0362	-0.0658
APPLE-10	-0.1556	-0.0178	0.1826	-0.1065	-0.3020	0.0112	-0.1007	0.1514	-0.0436	-0.0631
APPLE-11	0.0765	0.1675	0.0936	0.0985	0.0393	0.0915	0.1612	0.2786	0.0590	0.2032
APPLE-12	-0.0950	0.2253	-0.0306	0.1086	0.0351	-0.1043	0.0482	0.1469	-0.1677	-0.0110
APPLE-13	-0.0521	0.2654	0.1908	0.0386	-0.1184	-0.1366	-0.0109	0.1012	0.0901	-0.0530
APPLE-14	-0.1052	0.1252	0.0453	-0.0581	0.1716	0.2349	0.1125	0.0552	0.1879	0.2401
TCH--SEX	-0.2046	0.3302	0.3074	-0.0543	-0.0923	-0.2808	0.1732	0.3803	0.0773	0.1027
TCH--AGE	-0.0124	-0.0707	0.0046	-0.0904	-0.0191	0.1611	0.0935	0.0483	0.0996	0.1691
T-YRSSCH	-0.2026	0.3218	0.2048	-0.0120	0.1161	-0.1321	0.0879	0.0559	-0.0285	0.0719
T-YRSTCH	-0.0035	-0.0211	-0.0868	0.1059	0.1557	0.0547	-0.1126	-0.0113	-0.1072	-0.0356
T-ED.LEV	-0.0394	0.2534	0.2044	-0.1172	-0.2744	0.1941	0.3796	0.3530	0.0619	0.3771
SX-T & A	-0.1143	0.1393	0.2036	-0.2010	-0.0997	-0.2000	0.0727	0.2378	0.0110	-0.0353
DIS.FUND	-0.1107	-0.1306	0.0547	-0.5101	-0.2797	0.2177	0.2316	0.3211	0.3700	0.3307
PRIN-CHG										

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Final Structural Analysis
Grade 2 Reading (continued)

CORRELATIONS

	S COGSTY	S-ATT.-F	S-ATT.-S	S-EXP.-F	S-EXP.-S	CAT RCMP	READ APP	DECODING	READ ACH	TOT READ
IN..OP	0.0388	-0.0739	-0.0446	-0.3252	-0.2293	0.0138	0.1174	0.0190	0.3293	0.1681
TE.RING	0.0060	0.0600	0.0485	-0.2049	-0.1143	-0.1830	0.2004	-0.0631	-0.0530	-0.0506
CONFIDUS	0.1397	0.0913	-0.0632	0.2854	0.3131	-0.0334	-0.1204	-0.0532	-0.0027	-0.2103
CENTRALO	0.1568	0.0714	-0.0701	0.2233	0.3210	-0.1652	-0.0506	0.0020	-0.0990	-0.1562
PRINCIP	0.0673	-0.0788	0.0021	0.0137	0.0882	0.3181	-0.1630	-0.0556	0.0529	0.0251
P. STYLE	-0.1562	-0.0416	-0.0049	-0.3645	-0.2629	0.1075	0.0487	0.2714	0.2136	0.1926
P. STYLE	-0.0640	-0.0208	-0.0346	-0.2489	-0.2611	-0.1107	-0.3658	-0.0471	-0.0753	-0.3186
PSTYLE-T	-0.1763	0.2194	0.1434	0.2367	-0.0056	-0.3822	0.2749	0.0565	-0.2151	0.0912
CLASS CL	0.2476	-0.1215	-0.2186	0.2720	0.1727	0.0118	0.0358	0.0330	-0.0408	0.1610
ASPIRAT.	-0.0664	0.2637	0.0926	-0.0302	0.0576	0.0346	0.0079	0.2617	0.0613	0.0396
SATISFCT	0.1460	-0.0045	0.0237	0.3582	0.2029	-0.1210	0.1021	0.0659	-0.0064	0.1562
T.P.STUD	0.2887	-0.2731	-0.5114	0.3088	0.5070	0.0071	-0.2634	-0.3686	-0.0209	-0.1424
TEACH.KN	-0.3583	0.1466	0.1258	-0.2626	-0.2835	0.0129	0.0660	0.0287	-0.0767	0.0516
SUBJECTK	0.0394	-0.1170	-0.1360	0.1686	-0.0581	0.0403	0.0362	-0.1589	-0.1386	0.0003
VERS.FL.	0.3829	-0.0163	-0.2589	0.2272	0.1568	0.1748	0.0747	-0.1465	-0.3308	0.0424
MEMORY	0.1273	0.0884	-0.0806	-0.1987	-0.2718	0.0391	0.1194	0.2446	0.0683	-0.0525
REASONNG	0.2079	-0.1548	-0.2464	0.1186	0.0336	-0.0994	-0.0340	-0.1880	-0.2060	-0.1407
FLEXIBLE	0.2126	-0.1221	-0.2081	0.0971	0.0494	-0.0128	-0.1607	-0.1922	-0.2168	-0.2431
T COGSTY	0.4233	-0.1793	-0.2583	0.2600	0.1252	0.1406	-0.1482	-0.1780	-0.3741	-0.1630
SPIAN	0.5798	-0.2422	-0.5452	0.6039	0.5087	-0.0190	-0.1997	-0.3270	-0.1600	-0.2059
S COGSTY	1.0000	-0.2411	-0.4272	0.6307	0.4868	0.1147	-0.1931	-0.3085	-0.1479	-0.1266
S-ATT.-F	-0.2411	1.0000	0.6856	-0.1342	-0.1385	0.0948	0.0133	0.4570	0.0033	0.0253
S-ATT.-S	-0.4272	0.6856	1.0000	-0.3882	-0.3097	0.0992	0.1791	0.5279	0.2940	0.2438
S-EXP.-F	0.6307	-0.1342	-0.3882	1.0000	0.6133	-0.2023	-0.2836	-0.3989	-0.3735	-0.2889
S-EXP.-S	0.4868	-0.1385	-0.3097	0.6133	1.0000	0.0612	-0.3016	-0.3775	-0.0575	-0.1882
CAT RCMP	0.1147	0.0948	0.0992	-0.2023	0.0612	1.0000	0.0965	0.1928	0.1516	0.4781
READ APP	-0.1931	0.0133	0.1791	-0.2836	-0.3016	0.0965	1.0000	0.4431	0.4352	0.6363
DECODING	-0.3085	0.4570	0.5279	-0.3989	-0.3775	0.1928	0.4431	1.0000	0.4672	0.4339
READ ACH	-0.1479	0.0033	0.2940	-0.3735	-0.0575	0.1516	0.4352	0.4672	1.0000	0.6372
TOT READ	-0.1266	0.0253	0.2438	-0.2889	-0.1882	0.4781	0.6363	0.4339	0.6372	1.0000
PSEUDO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

BTES - FINAL STRUCTURAL ANALYSIS - GRADE 5 READING 10:38:13 5/06/75 PAGE 2

CORRELATIONS

	WD-----1	WD-----2	WD-----3	WD-----4	WD-----5	RAMOS--1	RAMOS--2	RAMOS--3	RAMOS--4	APPLE--1
WD-----1	1.0000	0.2328	0.0370	0.2821	0.1312	0.0378	-0.0426	0.0798	-0.0769	0.1931
WD-----2	0.2328	1.0000	0.3328	0.3131	0.0259	-0.1465	-0.1437	0.0194	0.0113	-0.1518
WD-----3	0.0370	0.3328	1.0000	-0.0712	0.0912	0.0391	0.0183	0.0332	0.0118	0.1468
WD-----4	0.2821	0.3131	-0.0712	1.0000	0.0157	0.0475	-0.0879	0.0008	0.1416	0.1638
WD-----5	0.1312	0.0259	0.0912	0.0157	1.0000	0.2956	0.0691	0.1642	0.1641	0.1161
RAMOS--1	0.0378	-0.1465	0.0391	0.0475	0.2956	1.0000	0.4410	0.6511	0.3919	0.0925
RAMOS--2	-0.0426	-0.1437	0.0183	-0.0879	0.0691	0.4410	1.0000	0.6493	0.5500	0.1526
RAMOS--3	0.0798	0.0194	0.0332	0.0008	0.1642	0.6511	0.6493	1.0000	0.4968	-0.0159
RAMOS--4	-0.0769	0.0113	0.0118	0.1416	0.1641	0.3919	0.5500	0.4968	1.0000	0.1177
APPLE--1	0.1931	-0.1518	0.1468	0.1638	0.1161	0.0925	0.1526	-0.0159	0.1177	1.0000
APPLE--2	-0.0935	-0.1525	0.0247	-0.1696	-0.1149	0.0512	0.0644	-0.1533	0.0001	-0.4296
APPLE--3	0.0291	0.3266	0.1230	0.1992	0.1817	-0.0075	-0.0302	0.1547	0.0177	-0.0177
APPLE--5	0.1349	0.0125	-0.1301	-0.0076	-0.3290	-0.1543	-0.2162	-0.2861	-0.1693	-0.2196
APPLE--6	0.0919	-0.2766	0.1963	-0.0775	0.1638	0.0644	0.2552	0.0691	0.1025	-0.5744
APPLE--7	-0.2551	0.2136	0.1553	-0.0365	0.2200	-0.0347	-0.1634	-0.0001	-0.0217	-0.1958
APPLE--8	0.1722	-0.0529	0.1558	-0.0397	0.0175	0.2311	0.2216	0.3179	0.3372	0.1356
APPLE--9	0.1097	0.1093	0.1936	0.1214	-0.2168	0.0571	-0.0538	-0.0212	0.0552	-0.1304
APPLE-10	-0.1600	0.0424	0.1214	-0.0576	0.1591	0.1171	0.1360	0.0767	-0.0076	0.1761
APPLE-11	-0.1713	-0.1113	-0.1813	-0.0943	0.1067	-0.0844	-0.1024	-0.0790	-0.1776	-0.2784
APPLE-12	-0.0422	0.0145	0.2851	-0.1521	0.1726	-0.1638	0.0468	-0.0086	-0.1115	0.2695
APPLE-13	-0.1314	-0.2278	-0.1464	-0.0268	0.1550	0.0000	-0.0203	-0.0146	-0.0520	0.0994
APPLE-14	-0.0400	-0.0977	0.0875	0.2044	0.0547	0.0478	0.1065	0.0801	0.1954	0.1070
TCH--SEX	0.2172	0.0401	0.1043	-0.0632	0.4006	0.0615	-0.2416	0.1174	-0.0464	-0.1603
TCH--AGE	0.0031	0.3036	0.2887	-0.0690	-0.0373	-0.1107	-0.1402	0.0131	-0.1525	-0.1905
T-YRSSCH	-0.0257	-0.0429	0.0111	-0.0566	0.2062	0.0016	0.0959	0.0923	0.0729	0.0111
T-YRSTCH	0.0020	0.0022	0.1316	-0.1034	-0.1575	-0.1445	0.0140	0.1787	-0.0466	-0.1795
T-EDLEV	-0.0462	-0.0070	-0.1117	0.0509	0.0288	-0.3260	-0.0643	-0.1636	-0.1024	0.0061
EX-T & A	-0.0351	0.1035	0.0589	0.0876	-0.2691	0.0365	0.3491	0.0613	0.1333	0.0013
DIS.FUND	-0.2758	-0.1430	-0.1198	-0.0984	-0.0979	-0.1788	-0.3691	-0.2588	-0.2021	-0.1498
PRIN-CHG	-0.2749	-0.2793	-0.1218	0.0360	0.0467	-0.0270	-0.1934	-0.2712	0.0124	0.0151

Final Structural Analysis
Grade 5 Reading (continued)

CORRELATIONS

	WD-----1	WD-----2	WD-----3	WD-----4	WD-----5	RAMOS--1	RAMOS--2	RAMOS--3	RAMOS--4	APPLE--1
INS.COMP	0.2185	0.1957	-0.0797	0.0110	0.1496	-0.0200	-0.2993	-0.1940	-0.0585	0.0375
TEAMING	-0.1270	0.0570	-0.0084	-0.0590	0.0037	0.1250	0.0150	0.0465	0.0732	-0.3346
CURIOUS	-0.1248	0.1048	0.1658	-0.3818	0.1021	-0.0499	-0.1525	0.1408	-0.0267	-0.2113
CRITKIND	-0.0460	-0.0143	0.2428	-0.0402	0.1656	0.0658	-0.2220	-0.0077	-0.0536	0.0468
PATIENCE	-0.0239	0.1968	-0.0764	0.1127	-0.0842	-0.0073	0.0757	-0.0393	0.0782	0.0246
SC STYLE	-0.1656	-0.1577	-0.3831	0.1145	-0.0679	-0.1133	-0.1570	-0.2538	0.1071	-0.3329
PC STYLE	0.1236	0.0365	-0.2830	0.2300	0.2063	-0.0657	-0.2382	-0.2004	-0.2184	-0.1113
PSTYLE-T	0.2144	0.3874	0.2908	0.1956	0.1053	-0.1697	-0.3773	0.0303	-0.1361	-0.1565
CLASS CL	0.3341	0.0674	-0.1184	0.1097	0.1246	-0.0543	-0.2131	-0.0518	-0.1621	0.2671
ASPIRAT.	0.0992	0.1373	-0.1089	0.2876	-0.1702	-0.0877	0.0192	0.0314	-0.1559	0.0074
SATISFCT	-0.0151	0.1989	0.0757	-0.0264	0.1665	0.0166	-0.0276	0.1912	-0.0600	-0.1215
T.P.STUD	-0.0335	0.1001	0.0211	-0.1096	0.0274	-0.1989	-0.3370	-0.3524	-0.1141	-0.0100
TEACH.KN	0.1100	0.0431	-0.0278	0.0085	-0.0041	-0.3175	0.0353	-0.2787	-0.0425	0.1290
SUBJECTK	0.0482	0.1409	0.1663	0.0857	0.1973	-0.2406	-0.0373	-0.1739	-0.0126	0.0364
VERB.FL.	0.3422	0.3423	0.2569	0.1381	-0.2131	-0.2777	-0.1979	-0.2742	-0.1256	0.0307
MEMORY	-0.0974	-0.0913	-0.0204	-0.0997	0.0212	-0.2762	-0.1970	-0.3967	-0.1495	0.0008
REASONNG	-0.0513	0.0703	-0.1922	-0.1544	-0.0712	-0.2759	0.0010	-0.2914	-0.1378	0.0501
FLEXIBLE	0.0770	0.1796	-0.0256	0.1299	0.0098	-0.2081	-0.1210	-0.3234	-0.0733	-0.0717
T COGSTY	-0.0917	0.1508	0.0680	-0.0930	0.0587	-0.2143	0.0072	-0.2714	-0.0587	0.0164
SFTAA	-0.1154	0.0289	-0.2050	-0.0462	0.1868	0.0260	0.0125	-0.0274	0.1395	-0.1015
S COGSTY	-0.1237	0.0269	-0.1576	-0.1919	0.1732	-0.0500	0.0345	-0.1094	0.1272	-0.1973
S-ATT.-F	-0.1396	0.0474	0.0227	-0.1872	0.1259	0.0619	0.0083	0.1889	-0.0362	-0.1749
S-ATT.-S	-0.0157	0.2688	-0.0035	-0.0036	0.0715	-0.2187	-0.0700	-0.0760	0.0265	0.1354
S-EXP.-F	0.0755	0.0552	-0.1099	-0.1242	-0.0898	0.0681	0.1670	0.3382	-0.0656	0.1129
S-EXP.-S	0.0866	0.0852	-0.2091	0.0417	-0.0235	-0.0237	-0.0123	-0.0144	-0.0954	0.0170
CAT RCMP	-0.1958	0.0441	0.0395	0.1595	0.0609	-0.2430	-0.0060	-0.1238	0.0440	0.0315
READ APP	0.0382	0.1388	-0.0687	0.2138	-0.1565	-0.1205	-0.0897	-0.3177	-0.1319	0.0223
DECODING	0.0775	0.1270	0.1359	0.2667	-0.2747	0.0426	-0.0770	-0.2766	-0.0755	0.0050
READ ACH	-0.1799	-0.0185	-0.1906	-0.0198	-0.1114	0.0133	-0.2601	-0.0937	0.0069	0.0160
TOT READ	-0.1576	0.0844	-0.1299	0.1792	-0.1203	-0.1061	-0.1406	-0.2365	-0.0524	-0.0127
PSEUDO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Final Structural Analysis
Grade 5 Reading (continued)

CORRELATIONS

	APPLE--2	APPLE--3	APPLE--5	APPLE--6	APPLE--7	APPLE--8	APPLE--9	APPLE-10	APPLE-11	APPLE-12
WD-----1	-0.0995	0.0291	0.1349	0.0919	-0.2551	0.1722	0.1697	-0.1600	-0.1713	-0.0022
WD-----2	-0.1325	0.3266	0.0125	-0.2706	0.2136	-0.0529	0.1093	0.0424	-0.1113	0.0145
WD-----3	0.0247	0.1230	-0.1301	0.1963	0.1553	0.1558	0.1906	0.1214	-0.1613	0.2351
WD-----4	-0.1696	0.1992	-0.0076	-0.0775	-0.0365	-0.0397	0.1214	-0.0576	-0.0943	-0.1521
WD-----5	-0.1149	0.1817	-0.3290	0.1838	0.2200	0.0175	-0.2168	0.1591	0.1667	0.1726
RAMOS--1	0.0512	-0.0075	-0.1543	0.0044	-0.0347	0.2311	0.0571	0.1171	-0.0844	-0.1638
RAMOS--2	0.0044	-0.0302	-0.2162	0.2552	-0.1684	0.2216	-0.0538	0.1360	-0.1024	0.0468
RAMOS--3	-0.1503	0.1547	-0.2861	0.0691	-0.0001	0.3179	-0.0212	0.0707	-0.0790	-0.0566
RAMOS--4	0.0001	0.0177	-0.1893	0.1020	-0.0217	0.3372	0.0552	-0.0370	-0.1776	-0.1115
APPLE--1	-0.2248	-0.0077	-0.2196	0.5744	-0.1658	0.1030	0.1304	0.0760	-0.2784	0.2395
APPLE--2	1.0000	-0.5570	0.5434	-0.1848	-0.0395	0.1534	-0.0840	-0.0762	0.2612	-0.3203
APPLE--3	-0.5570	1.0000	-0.3685	0.2063	0.2538	-0.0217	0.1602	0.2448	-0.2242	0.2650
APPLE--5	0.5434	-0.3685	1.0000	-0.3720	-0.3113	-0.0040	0.1011	-0.2316	0.2051	-0.3125
APPLE--6	-0.1848	0.2063	-0.3720	1.0000	-0.3189	0.1233	0.0444	0.0974	-0.3227	0.2842
APPLE--7	-0.0395	0.2538	-0.3113	-0.3189	1.0000	0.0853	-0.0167	0.4750	-0.0834	0.2663
APPLE--8	0.1534	-0.0217	-0.0040	0.1233	0.0853	1.0000	-0.1754	-0.0051	-0.0708	0.0722
APPLE--9	-0.0840	0.1602	0.1011	0.0444	-0.0167	-0.1754	1.0000	-0.0111	-0.1645	0.1395
APPLE-10	-0.0762	0.2448	-0.2316	0.0974	0.4750	-0.0051	-0.0111	1.0000	-0.3503	0.1513
APPLE-11	0.2612	-0.2242	0.2051	-0.3227	-0.0834	-0.0708	-0.1645	-0.3503	1.0000	-0.0853
APPLE-12	-0.3203	0.2650	-0.3125	0.2842	0.2663	0.0722	0.1395	0.1513	-0.0853	1.0000
APPLE-13	0.2091	-0.2086	0.2451	-0.1430	-0.0107	-0.0330	-0.2059	-0.0268	0.1445	0.1905
APPLE-14	0.1089	0.2741	-0.0142	0.3020	-0.0062	0.1698	-0.0250	0.0887	-0.2464	0.0365
TCH--SEX	-0.2505	0.2531	-0.1984	0.1017	0.1463	0.0749	0.0105	-0.0368	-0.0457	0.1749
TCH--AGE	0.1018	0.1699	0.1521	-0.0799	0.1762	0.1337	-0.0754	0.1476	0.0833	0.1330
T-YRSSCH	0.1922	0.0461	0.1826	-0.0088	0.1009	0.1715	0.0437	-0.0100	0.1916	0.0981
T-YRSTCH	0.0398	0.1374	0.1662	-0.1373	-0.0032	0.1935	0.0074	-0.0022	0.1910	0.0743
T-EDLEV	0.1043	-0.0170	0.0070	0.0780	0.1023	-0.0309	-0.1095	-0.0153	0.1693	0.1632
EX-T & A	0.1037	-0.1449	0.0647	0.0583	-0.0943	0.2616	0.2801	-0.0404	-0.0546	0.0154
DISADJ3	-0.2231	0.1158	-0.2329	-0.0140	0.2402	-0.2300	-0.1390	-0.0065	0.0177	-0.0696
PRIN-CHG	-0.0745	-0.0849	-0.3144	0.0091	0.0848	-0.1155	0.0306	0.0499	0.1202	-0.1202

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Final Structural Analysis
Grade 5 Reading (continued)

CORRELATIONS

	APPLE--2	APPLE--3	APPLE--5	APPLE--6	APPLE--7	APPLE--8	APPLE--9	APPLE-10	APPLE-11	APPLE-12
INS.COMP	-0.1342	-0.2260	0.2130	-0.2085	-0.1004	-0.0781	0.1320	-0.2242	0.1166	-0.0071
TEAMING	0.2307	0.0473	-0.1325	-0.0761	0.0793	0.0551	-0.0413	-0.1989	0.0538	0.0332
CONCENUS	-0.1884	0.0479	-0.2665	-0.0048	0.2365	-0.1808	-0.0446	0.0461	-0.2010	0.1399
CENTRALD	0.2074	0.1636	0.1146	0.1201	0.2500	0.1253	0.1836	0.1660	-0.0993	0.1707
PRINHELP	-0.0426	-0.0089	-0.1574	-0.1437	0.0469	0.0575	-0.1042	0.0452	-0.0035	-0.0056
S. STYLE	0.0813	-0.1968	0.0764	-0.3012	0.0324	0.1306	-0.0722	-0.1315	0.2728	-0.0865
P. STYLE	0.0395	0.1271	0.0587	-0.1395	0.0940	0.0616	-0.0489	0.0223	0.0399	0.0240
PSTYLE-T	0.0776	0.3687	0.1330	-0.0136	0.0250	0.1001	0.1578	-0.0948	-0.0163	0.1355
CLASS CL	-0.2654	0.1043	-0.0859	0.1147	-0.0573	0.0131	-0.0268	-0.0391	-0.1803	0.1247
ASPIRAT.	-0.2092	-0.0076	-0.0473	-0.0582	0.0252	-0.1589	0.3307	0.0556	-0.1627	0.0118
SATISFCT	-0.0441	0.2261	0.1042	-0.1434	0.0432	-0.0203	0.2858	-0.0833	0.2595	0.3458
T.P.STUD	-0.0693	-0.0961	-0.0030	-0.3075	0.3168	-0.2351	0.0483	0.0293	0.0190	0.2894
TEACH.KN	-0.2585	0.2408	-0.0183	0.1130	0.0864	-0.1177	-0.0311	0.3236	-0.0550	0.1516
SUBJECTK	-0.0866	0.2292	-0.1159	0.0550	0.0722	-0.2160	-0.0401	0.1802	0.1774	-0.0132
VERB.FL.	0.0046	0.1114	0.1098	-0.2112	0.1433	-0.0316	0.0599	0.1774	-0.1099	-0.1235
MEMORY	0.0250	-0.2421	-0.0058	0.0094	0.0155	-0.0828	0.1196	-0.0123	0.0357	-0.1600
REASONNG	-0.0117	-0.0724	0.0986	-0.1430	0.0665	-0.2883	-0.1451	0.1200	0.0313	-0.1782
FLEXIBLE	-0.0120	0.0516	0.0454	-0.1025	-0.0379	-0.2262	-0.0244	0.0387	-0.0085	-0.0380
T COGSTY	-0.1383	0.1469	-0.1069	-0.0863	0.1541	-0.2684	-0.0635	0.2886	-0.0132	0.0265
SFTAA	0.0121	0.0680	0.1092	-0.2648	0.1198	0.0866	-0.0484	0.0938	0.1194	-0.1127
S COGSTY	0.1150	0.0545	0.1056	-0.2372	0.2081	0.0539	-0.1237	0.2585	0.0359	-0.1277
S-ATT.-F	0.0073	-0.1471	-0.2088	-0.0610	0.1325	0.2579	-0.1951	-0.0207	0.1446	0.3526
S-ATT.-S	-0.1097	0.0716	-0.1217	-0.1406	0.3271	0.1060	-0.0609	0.0768	-0.1427	0.1005
S-EXP.-F	-0.0738	-0.1301	-0.1542	-0.0104	-0.1736	0.0876	-0.2592	-0.0802	-0.0177	-0.0973
S-EXP.-S	-0.1688	-0.1032	-0.1833	-0.2233	0.0126	-0.0242	-0.3455	0.0935	-0.0678	-0.2092
CAT RCMP	-0.1774	0.2303	-0.1685	0.0621	0.1652	-0.0264	-0.1071	0.2141	-0.0777	-0.0866
READ APP	-0.1873	0.0372	-0.0363	0.0212	-0.0763	-0.2433	0.1267	0.0486	0.0610	-0.0159
DECODING	0.0514	-0.0992	0.1220	0.1097	-0.3156	-0.0651	0.1090	0.0192	-0.1376	-0.0298
READ ACH	-0.0114	0.0350	0.1004	-0.0267	0.0716	-0.1646	0.2050	0.1686	0.0040	-0.0695
TOT READ	-0.1988	0.0429	-0.0697	-0.0179	0.0529	-0.2777	0.1236	0.1795	0.0237	-0.0661
PSEUDO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Final Structural Analysis
Grade 5 Reading (continued)

CORRELATIONS

	APPLE-13	APPLE-14	TCH--SEX	TCH--AGE	T-YRSSCH	T-YRSTCH	T-ED.LEV	EX-T & A	DIS.FUND	PRIN-CHG
WD-----1	-0.1314	-0.0400	0.2172	0.0031	-0.0257	0.0020	-0.0462	-0.0351	-0.2758	-0.2749
WD-----2	-0.2278	-0.0977	0.0401	0.3036	-0.0429	0.3022	-0.0070	0.1035	-0.1436	-0.2793
WD-----3	-0.1464	0.0875	0.1843	0.2887	0.0111	0.1516	-0.1117	0.0589	-0.1198	-0.1218
WD-----4	-0.0268	0.2044	-0.0632	-0.0890	-0.0566	-0.1034	0.0509	0.0876	-0.0984	0.0360
WD-----5	0.1350	0.0347	0.4006	-0.0373	0.2062	-0.1575	0.0288	-0.2691	-0.0979	0.0467
RAMOS--1	0.0660	0.0478	0.0615	-0.1107	0.0016	-0.1445	-0.3260	0.0305	-0.1788	-0.0270
RAMOS--2	-0.0203	0.1065	-0.2416	-0.1402	0.0939	0.0140	-0.0643	0.3491	-0.3091	-0.1934
RAMOS--3	-0.0146	0.0861	0.1174	0.0131	0.0923	0.1787	-0.1636	0.0613	-0.2536	-0.2712
RAMOS--4	-0.0520	0.1954	-0.0404	-0.1525	0.0729	-0.0466	-0.1024	0.1383	-0.2621	0.0124
APPLE--1	0.0604	0.1690	-0.1003	-0.0965	0.0111	-0.1055	0.0061	0.0619	-0.1445	0.0191
APPLE--2	0.2001	0.1089	-0.2505	0.1018	0.1922	0.0393	0.1043	0.1037	-0.2231	-0.0745
APPLE--3	-0.2086	0.2741	0.2531	0.1699	0.0461	0.1374	-0.0170	-0.1449	0.1156	-0.0847
APPLE--5	0.2451	-0.0142	-0.1984	0.1521	0.1826	0.1662	0.0070	0.0647	-0.2329	-0.3144
APPLE--6	-0.1430	0.3020	0.1017	-0.0799	-0.0088	-0.1373	0.0780	0.0583	-0.0140	0.0391
APPLE--7	-0.0107	-0.0062	0.1463	0.1762	0.1009	-0.0032	0.1023	-0.0943	0.2402	0.0848
APPLE--8	-0.0330	0.1898	0.0749	0.1337	0.1715	0.1935	-0.0309	0.2616	-0.2300	-0.1155
APPLE--9	-0.2059	-0.0250	0.0105	-0.0754	0.0437	0.0074	-0.1095	0.2801	-0.1390	0.0358
APPLE-10	-0.0268	0.0887	-0.0368	0.1476	-0.0100	-0.0022	-0.0153	-0.0464	-0.0365	0.0499
APPLE-11	0.1445	-0.2464	-0.0457	0.0833	0.1916	0.1910	0.1653	-0.0546	0.0177	0.1202
APPLE-12	0.1586	0.0365	0.1749	0.1330	0.0981	0.0743	0.1632	0.0154	-0.0096	-0.1262
APPLE-13	1.0000	-0.0223	-0.2256	-0.0498	-0.0301	-0.0262	0.1069	-0.2865	-0.2190	-0.1543
APPLE-14	-0.0223	1.0000	-0.0787	0.2874	0.2869	0.1395	0.2642	-0.0705	-0.1683	0.0753
TCH--SEX	-0.2256	-0.0787	1.0000	-0.0757	0.0016	-0.1515	-0.1293	-0.2018	0.0799	-0.0039
TCH--AGE	-0.0498	0.2874	-0.0757	1.0000	0.4054	0.7664	0.3565	-0.0732	-0.1985	-0.2616
T-YRSSCH	-0.0301	0.2869	0.0016	0.4054	1.0000	0.4062	0.3616	0.0752	-0.2254	-0.1279
T-YRSTCH	-0.0262	0.1395	-0.1515	0.7664	0.4062	1.0000	0.2011	0.0535	-0.2653	-0.2421
T-ED.LEV	0.1069	0.2642	-0.1293	0.3565	0.3616	0.2011	1.0000	0.0293	-0.1601	0.0674
EX-T & A	-0.2865	-0.0705	-0.2018	-0.0732	0.0752	0.0535	0.0293	1.0000	-0.0623	-0.0180
DIS.FUND	-0.2190	-0.1683	0.0799	-0.1985	-0.2254	-0.2653	-0.1601	-0.0623	1.0000	0.3913
PRIN-CHG	-0.1543	0.0753	-0.0039	-0.2616	-0.1279	-0.2421	0.0674	-0.0180	0.3913	1.0000

Final Structural Analysis
Grade 5 Reading (continued)

CORRELATIONS

	APPLE-13	APPLE-14	TCH--SEX	TCH--AGE	T-YRSSCH	T-YRSTCH	T-ED.LEV	EX-T & A	DIS.FUND	PRIN-CHG
INS.COMP	0.0352	-0.3184	0.0686	-0.0074	-0.1124	0.0335	0.0338	0.1326	-0.1070	0.0551
TEAMIND	-0.1754	-0.0502	0.2109	-0.0931	-0.0117	-0.1147	0.1098	0.3357	0.2379	0.0553
CONSENSUS	-0.1161	-0.2167	0.4068	0.0338	-0.0587	0.0378	-0.1425	-0.0103	0.3208	-0.0757
CERTAIN	0.2031	0.1795	0.1691	0.3484	0.1686	0.1462	0.2880	-0.1748	-0.2134	-0.1100
PRINHELP	0.0272	-0.0395	-0.2454	0.0473	-0.2600	0.1606	-0.0929	-0.0348	0.0012	0.0702
S. STYLE	0.0922	0.0255	-0.2063	-0.0786	0.1776	0.0805	0.1992	0.1969	0.0295	0.0096
P. STYLE	0.2670	0.1389	-0.0381	0.0568	0.2524	0.1648	0.1534	-0.0833	-0.2433	0.0138
PSTYLE-I	-0.0853	0.2846	0.2005	0.3266	0.4085	0.2348	0.2319	0.0000	-0.0792	-0.1923
CLASS CL	0.1747	-0.0956	0.1431	0.0522	-0.0336	-0.0992	0.3155	-0.3509	-0.1193	-0.0764
ASPIRAT.	-0.0034	0.0701	-0.3465	-0.0198	-0.1018	-0.0170	0.1632	0.0799	-0.0390	-0.0588
SATISFCT	0.0248	0.1578	0.1080	0.4176	0.3863	0.4260	0.4543	-0.0875	-0.2078	-0.1332
T.P.STUD	0.1883	-0.2433	-0.1627	0.2149	-0.0707	0.1246	0.1497	-0.1509	0.1497	-0.0814
TEACH.AN	-0.1544	-0.1423	-0.0086	-0.1154	0.0847	-0.0440	-0.0774	0.1211	0.1481	-0.0811
SUBJECTK	-0.1438	-0.0663	-0.0438	0.0983	0.3449	0.0466	0.1629	-0.2247	0.0669	0.1403
VERB.FL.	-0.1815	0.0236	-0.1364	0.2381	0.2914	0.2058	0.0467	0.0268	0.0554	0.1479
MEMORY	-0.2030	-0.1778	-0.0245	-0.1926	0.0753	-0.1963	-0.1302	0.1625	0.2199	0.2102
REASONNG	0.0109	-0.0924	-0.2819	-0.2363	0.0544	-0.1869	0.0501	0.0554	0.1355	0.0699
FLEXIBLE	-0.2572	-0.1125	0.0156	-0.1062	0.2203	-0.1603	-0.0049	0.0566	0.2345	0.2187
T COGSTY	-0.1468	-0.1828	-0.1689	-0.0540	0.0724	-0.0862	-0.1407	-0.0490	0.0988	0.0462
SFTAA	0.0080	0.0318	-0.1739	0.2074	0.4185	0.2269	0.2701	-0.1617	-0.2885	0.0171
S COGSTY	-0.0286	-0.0562	-0.1982	0.1969	0.3538	0.1870	0.0711	-0.0474	-0.0681	-0.0966
S-ATT.-F	-0.2539	-0.1132	0.2103	0.0825	0.0006	-0.0191	0.2065	0.1378	0.0052	-0.1427
S-ATT.-S	-0.1373	0.1054	0.0635	0.1119	-0.0404	0.0703	0.3005	0.1279	0.0560	0.0020
S-EXP.-F	-0.1576	-0.0267	0.0721	0.0544	0.0550	0.1642	0.0194	0.1605	-0.1007	-0.0758
S-EXP.-S	-0.1085	-0.0382	-0.0540	0.0797	0.0306	0.0928	0.1893	0.0770	0.0114	0.1600
LAT RCMP	-0.0929	0.1474	-0.1906	0.3334	0.1961	0.1905	0.2785	0.0940	0.2251	0.1646
READ APP	-0.2461	-0.1586	-0.0323	0.0019	-0.1059	-0.0264	0.0596	0.1911	0.3759	0.2378
DECODING	-0.0619	-0.0634	0.0023	0.0491	-0.2043	-0.0931	-0.0010	0.2176	0.0404	0.1021
READ ACH	0.0655	-0.1023	0.0439	0.0412	-0.0322	0.0301	0.0130	-0.3626	0.2727	0.1223
TOT READ	-0.1373	-0.1214	-0.0458	0.0992	-0.0468	0.0378	0.1154	-0.0142	0.4071	0.2933
PSEUDO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

CORRELATIONS

	INS.COMP	TEAMING	CONCENUS	CENTRALD	PRINHELP	S. STYLE	P. STYLE	PSTYLE-T	CLASS CL	ASPIRAT.
MO-----1	0.2185	-0.1270	-0.1248	-0.0460	-0.0239	-0.1696	0.1236	0.2144	0.3541	0.1992
MO-----2	0.1957	0.0570	0.1048	-0.0143	0.1908	-0.1577	0.0565	0.3874	0.0674	0.1373
MO-----3	-0.0797	-0.0084	0.1658	0.2428	-0.0764	-0.3331	-0.2830	0.2908	-0.1184	-0.1669
MO-----4	0.0110	-0.0590	-0.3818	-0.0402	0.1127	0.1145	0.2300	0.1956	0.1097	0.2676
MO-----5	0.1496	0.0637	0.1021	0.1656	-0.0842	-0.0679	0.2063	0.1053	0.1246	-0.1702
RAMOS--1	-0.0260	0.1250	-0.0499	0.0658	-0.0073	-0.1133	-0.0657	-0.1697	-0.0543	-0.0877
RAMOS--2	-0.2993	-0.0150	-0.1525	-0.2220	0.0757	-0.1370	-0.2082	-0.3773	-0.2131	0.0192
RAMOS--3	-0.1940	0.0465	0.1408	-0.0077	-0.0398	-0.2538	-0.2064	0.0303	-0.0518	0.1314
RAMOS--4	-0.0580	0.0732	-0.0267	-0.0930	0.0782	0.1671	-0.2184	-0.1361	-0.1621	-0.1557
APPLE--1	0.0375	-0.3346	-0.2118	0.0468	0.0246	-0.3029	-0.1113	-0.1505	0.2671	0.1874
APPLE--2	-0.1342	0.2307	-0.1684	0.2674	-0.0426	0.0813	0.0395	0.0776	-0.2654	-0.0592
APPLE--3	-0.2260	0.0473	0.0479	0.1636	-0.0089	-0.1968	0.1271	0.3087	0.1643	-0.0076
APPLE--5	0.2130	-0.1325	-0.2665	0.1146	-0.1574	0.0764	0.0587	0.1330	-0.0059	-0.0473
APPLE--6	-0.2035	-0.0761	-0.0048	0.1201	-0.1437	-0.3012	-0.1395	-0.0136	0.1147	-0.0582
APPLE--7	-0.1004	0.0793	0.2365	0.2500	0.0469	0.0324	0.0940	0.0250	-0.0573	0.3292
APPLE--8	-0.0781	0.0551	-0.1808	0.1253	0.0375	0.1506	0.0616	0.1001	0.0131	-0.1589
APPLE--9	0.1320	-0.0413	-0.0446	0.1836	-0.1642	-0.0722	-0.0489	0.1578	-0.0266	0.3327
APPLE-10	-0.2242	-0.1489	0.0461	0.1660	0.0452	-0.1315	0.0223	-0.0948	-0.0391	0.0556
APPLE-11	0.1166	0.0538	-0.2010	-0.0993	-0.0635	0.2728	0.0399	-0.0163	-0.1803	-0.1627
APPLE-12	-0.0071	0.0352	0.1399	0.1707	-0.3056	-0.0865	0.0240	0.1355	0.1247	0.0118
APPLE-13	0.0552	-0.1754	-0.1161	0.2631	0.0272	0.0922	0.2670	-0.0853	0.1747	-0.3054
APPLE-14	-0.3184	-0.0502	-0.2167	0.1795	-0.0395	0.0255	0.1389	0.2846	-0.0956	0.0701
TCH--SEX	0.0686	0.2109	0.4068	0.1691	-0.2454	-0.2063	-0.0381	0.2005	0.1431	-0.3465
TCH--AGE	-0.0074	-0.0931	0.0338	0.3484	0.0473	-0.0786	0.0568	0.3266	0.0522	-0.0196
T-YRSSCH	-0.1124	-0.0117	-0.0587	0.1686	-0.2600	0.1776	0.2524	0.4085	-0.0336	-0.1018
T-YRSTCH	0.0335	-0.1147	0.0378	0.1462	0.1606	0.0805	0.1648	0.2348	-0.0992	-0.0170
T-EDLEV	0.0338	0.1098	-0.1425	0.2880	-0.0929	0.1992	0.1534	0.2319	0.3159	0.1632
CA-T A A	0.1326	0.3357	-0.0103	-0.1748	-0.0348	0.1969	-0.0833	0.0003	-0.3509	0.0799
CLS.FOND	-0.1670	0.2379	0.3208	-0.2134	0.0012	0.0295	-0.2438	-0.0792	-0.1193	-0.0340
PRIN-CHG	0.0551	0.0553	-0.0757	-0.1100	0.0702	0.4096	0.0138	-0.1925	-0.0764	-0.0583

Final Structural Analysis
Grade 5 Reading (continued)

CORRELATIONS

	INS.COMP	TEAMING	CONSENSUS	CENTRALD	PRINHELP	S. STYLE	P. STYLE	PSTYLE-T	CLASS CL	ASPIRAT.
INS.COMP	1.0000	-0.0826	0.0560	0.0386	0.0251	0.0444	-0.0860	-0.1421	0.1684	0.2223
TEAMING	-0.0826	1.0000	0.1932	0.0584	-0.2387	0.0947	-0.0466	0.2694	-0.1921	-0.2379
CONSENSUS	0.0560	0.1932	1.0000	0.0210	-0.1543	-0.2263	-0.1899	0.0232	0.0257	-0.2433
CENTRALD	0.0386	0.0584	0.0210	1.0000	-0.4164	-0.1464	0.0660	0.4330	0.4512	0.0238
PRINHELP	0.0251	-0.2387	-0.1543	-0.4164	1.0000	0.0674	0.0816	0.5494	-0.4848	-0.2262
S. STYLE	0.0444	0.0947	-0.2263	-0.1464	0.0674	1.0000	0.5494	-0.0408	-0.2139	0.0534
P. STYLE	-0.0860	-0.0466	-0.1899	0.0660	0.0816	0.5494	1.0000	0.1676	0.0637	0.0190
PSTYLE-T	-0.1421	0.2694	0.0232	0.4330	-0.4848	-0.0408	0.1676	1.0000	0.2590	-0.0157
CLASS CL	0.1684	-0.1921	0.0257	0.4512	-0.2262	-0.2139	0.0637	0.2590	1.0000	0.2298
ASPIRAT.	0.2223	-0.2379	-0.2433	0.0238	0.0534	0.0190	0.0816	-0.0157	0.2298	1.0000
SATISFCT	0.1600	0.1445	-0.0142	0.5949	-0.4872	0.0666	0.0407	0.6242	0.3005	0.1987
T.P.STUD	0.2467	0.0357	0.0201	0.1972	0.0449	0.2662	0.0876	0.3440	0.2243	0.1981
TEACH.AN	-0.1902	-0.1582	-0.0291	-0.2662	0.0410	0.2563	0.1431	-0.0439	-0.1771	-0.2041
SUBJECTA	-0.2043	-0.1205	-0.0824	-0.1868	0.1284	0.1250	0.0259	0.1688	-0.0536	-0.1783
VERBAL.	-0.1101	-0.1950	-0.0367	-0.2390	0.3643	0.0960	-0.0072	0.1161	-0.1392	-0.0855
MEMORY	0.2175	-0.1000	-0.0250	-0.2333	0.2189	0.1793	-0.0062	-0.1532	-0.1518	0.1815
REASONNG	0.1052	-0.1235	0.0148	-0.4061	0.3211	0.1011	0.0081	-0.2972	-0.2043	0.0529
FLEXIBLE	0.0209	-0.0053	-0.0069	-0.3752	0.3001	0.0779	-0.0639	-0.0166	-0.1702	-0.1213
T COGSTY	-0.0584	-0.2320	-0.0217	-0.4158	0.3769	-0.0241	-0.0519	-0.2845	-0.2609	-0.1810
SFTAA	0.1964	0.0238	-0.1802	0.1438	-0.0007	0.3093	0.2826	0.1421	0.1947	-0.0307
S COGSTY	0.0578	0.0190	0.0137	0.0026	0.0788	0.3230	0.1482	0.0131	-0.0179	-0.1433
S-ATT.-F	0.0930	0.2558	0.2006	0.1591	-0.0027	0.0486	0.0118	0.1129	0.1655	-0.1166
S-ATT.-S	0.1235	0.1537	0.0930	0.2367	-0.0523	0.0344	-0.0268	0.2029	0.2014	0.0741
S-EXP.-F	0.0287	0.0937	0.2720	-0.0635	0.0091	-0.2583	-0.1438	0.0055	0.1745	-0.0180
S-EXP.-S	0.1959	-0.0067	0.0830	-0.1588	0.1451	0.0995	0.0625	-0.0087	0.3324	0.1513
CAT ACMP	-0.0850	0.0471	-0.0631	0.0645	-0.0330	0.1073	0.0699	0.1304	0.1219	0.1361
READ APP	0.1638	0.1658	-0.0257	-0.1768	-0.0487	0.1808	-0.1170	-0.0632	-0.0595	-0.0668
DECODING	0.1447	0.0051	-0.1377	0.0240	0.0116	-0.0396	-0.1312	-0.0422	0.0414	-0.1250
READ ACH	-0.0750	-0.1435	0.0580	0.2040	-0.0516	0.0180	-0.0956	-0.0487	0.2356	0.0107
TOT READ	0.0354	0.0879	0.0348	-0.0061	-0.0741	0.1786	-0.0991	-0.0543	0.1169	0.0731
PSEUDO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Final Structural Analysis
Grade 5 Reading (continued)

CORRELATIONS

	SATISFCT	T.P.STUD	TEACH.KN	SUBJECTK	VERB.FL.	MEMORY	REASONNG	FLEXIBLE	T COGSTY	SFTAM
WD-----1	-0.0151	-0.0535	0.1100	0.0482	0.0422	-0.0474	-0.0513	0.0770	-0.0917	-0.1154
WD-----2	0.1989	0.1001	0.0431	0.1469	0.0423	-0.0913	0.0703	0.1796	0.1508	0.0219
WD-----3	0.0757	0.0211	-0.0278	0.1663	0.2569	-0.0204	-0.1922	-0.0256	0.0030	-0.2090
WD-----4	-0.0204	-0.1096	0.0085	0.0857	0.1381	-0.0957	-0.1544	0.1299	-0.0930	-0.0462
WD-----5	0.1005	0.0274	-0.0041	0.1973	-0.2131	0.0212	-0.0712	0.0098	0.0587	0.1808
RAMOS--1	0.0106	-0.1989	-0.3175	-0.2406	-0.2777	-0.2762	-0.2759	-0.2081	-0.2143	0.0280
RAMOS--2	-0.0276	-0.3370	0.0353	-0.0373	-0.1979	-0.1970	0.0010	-0.1210	0.0672	0.0125
RAMOS--3	0.1912	-0.3924	-0.2787	-0.1739	-0.2742	-0.3967	-0.2914	-0.3234	-0.2714	-0.2274
RAMOS--4	-0.0066	-0.1141	-0.0425	-0.0128	-0.1238	-0.1459	-0.1178	-0.0733	-0.0987	0.1525
APPLE--1	-0.1210	-0.0186	0.1246	0.0364	0.0501	0.0698	0.0591	-0.0717	0.0164	-0.1015
APPLE--2	-0.0441	-0.0893	-0.2585	-0.0866	0.0046	0.0250	-0.0117	-0.0120	-0.1333	0.0121
APPLE--3	0.2261	-0.0961	0.2408	0.2292	0.1114	-0.2421	-0.0724	0.0516	0.1469	0.0080
APPLE--5	0.1042	-0.0030	-0.0183	-0.1159	0.1098	-0.0358	0.0986	0.0454	-0.1069	0.1342
APPLE--6	-0.1434	-0.3075	0.1130	0.0550	-0.2112	0.0094	-0.1430	-0.1025	-0.0863	-0.2048
APPLE--7	0.0432	0.3168	0.0864	0.0722	0.1433	0.0153	0.0005	-0.0379	0.1941	0.1196
APPLE--8	-0.0203	-0.2351	-0.1177	-0.2160	-0.0316	-0.0828	-0.2883	-0.2262	-0.2034	0.0080
APPLE--9	0.2858	0.0483	-0.0311	-0.0401	0.0389	0.1156	-0.1451	-0.0244	-0.0635	-0.1464
APPLE-10	-0.0833	0.0293	0.3236	0.1802	0.1774	-0.0123	0.1200	0.0387	0.2886	0.0938
APPLE-11	0.2595	0.0190	-0.0050	0.1774	-0.1099	0.0357	0.0313	-0.0085	-0.0132	0.1194
APPLE-12	0.3458	0.2064	0.1916	-0.0132	-0.1285	-0.1800	-0.1782	-0.3088	0.0265	-0.1127
APPLE-13	0.0248	0.1883	-0.1544	-0.1438	-0.1815	-0.2030	0.0109	-0.2572	-0.1468	0.0080
APPLE-14	0.1578	-0.2433	-0.1423	-0.0663	0.0236	-0.1778	-0.0924	-0.1125	-0.1628	0.0313
TCH--SEX	0.1080	-0.1627	-0.0086	-0.0438	-0.1304	-0.0245	-0.2819	0.0156	-0.1089	-0.1759
TCH--AGE	0.4176	0.2149	-0.1194	0.0983	0.2381	-0.1926	-0.2363	-0.1062	-0.0540	0.2174
T-YRSSCH	0.3863	-0.0707	0.0847	0.3449	0.2914	0.0753	0.0544	0.2203	0.0724	0.4165
T-YRSTCH	0.4260	0.1246	-0.0440	0.0466	0.2058	-0.1963	-0.1889	-0.1603	-0.0862	0.2269
T-ED.LEV	0.4543	0.1497	-0.0774	0.1629	0.0467	-0.1302	0.0501	-0.0049	-0.1407	0.2761
EA-T & A	-0.0879	-0.1509	0.1211	-0.2247	0.0208	0.1025	0.0554	0.0566	-0.0490	-0.1317
DIS.FUND	-0.2878	0.1497	0.1461	0.0869	0.0554	0.2199	0.1355	0.2345	0.0988	-0.2065
PRIN-CHG	-0.1302	-0.0814	-0.0811	0.1993	0.1079	0.2162	0.0699	0.2187	0.0462	0.0171

Final Structural Analysis
Grade 5 Reading (continued)

CORRELATIONS

	SATISFCT	I.P.STUD	TEACH.AN	SUBJECTK	VERB.FL.	MEMORY	REASONNG	FLEXIBLE	T COGSTY	SFTAA
INS.COMP	0.1606	0.2467	-0.1982	-0.2843	-0.1101	0.2175	0.1052	0.0209	-0.0584	0.1904
TEAMING	0.1445	0.0357	-0.1382	-0.1205	-0.1953	-0.1000	-0.1235	-0.0053	-0.2320	0.0238
CONCENUS	-0.0142	0.0201	-0.0291	-0.0824	-0.0367	-0.0250	0.0148	-0.0069	-0.0217	-0.1662
CENTRALD	0.5949	0.1972	-0.2662	-0.1866	-0.2350	-0.2333	-0.4001	-0.3752	-0.4158	0.1133
PRIMCLP	-0.4872	0.0449	0.0410	0.1284	0.3043	0.2169	0.3211	0.3001	0.3709	-0.0367
P. STYLE	0.0866	0.2062	0.2563	0.1259	0.0960	0.1793	0.1011	0.0779	-0.0241	0.3093
P. STYLE	0.0407	0.0676	0.1431	0.0259	-0.0072	-0.0362	0.0081	-0.0639	-0.0519	0.2826
PSTYLE-T	0.0242	0.0440	-0.0439	0.1688	0.1161	-0.1552	-0.2972	-0.0166	-0.2845	0.1421
CLASS CL	0.3809	0.2243	-0.1771	-0.0536	-0.1392	-0.1518	-0.2643	-0.1702	-0.2809	0.1947
ASPIRAT.	0.1587	0.1981	-0.2041	-0.1788	-0.0855	0.1616	0.0529	-0.1213	-0.1810	-0.0357
SATISFCT	1.0000	0.1794	-0.1555	-0.0691	-0.1583	-0.3110	-0.3246	-0.3122	-0.4132	0.4643
I.P.STUD	0.1794	1.0000	0.1497	-0.0452	-0.0019	0.0945	0.0082	-0.1344	0.0626	0.2740
TEACH.AN	-0.1555	0.1497	1.0000	0.5594	0.3532	0.2256	0.4591	0.3959	0.5300	0.1350
SUBJECTK	-0.0691	-0.0452	0.5594	1.0000	0.6425	0.2118	0.3939	0.6256	0.5694	0.3020
VERB.FL.	-0.1583	-0.0019	0.3532	0.6425	1.0000	0.2400	0.5184	0.7351	0.5985	0.2220
MEMORY	-0.3110	0.0945	0.2256	0.2118	0.2400	1.0000	0.3598	0.4281	0.3525	0.0240
REASONNG	-0.3246	0.0082	0.4591	0.3939	0.5184	0.3598	1.0000	0.6243	0.6232	0.1671
FLEXIBLE	-0.3122	-0.1344	0.3959	0.6256	0.7351	0.4281	0.6243	1.0000	0.6471	0.1474
T COGSTY	-0.4132	0.0626	0.5300	0.5694	0.5985	0.3525	0.6232	0.6471	1.0000	0.1719
SFTAA	0.4643	0.2740	0.1350	0.3020	0.2220	0.0240	0.1671	0.1474	0.1719	1.0000
T COGSTY	0.1169	0.3540	0.3021	0.3476	0.3973	0.0904	0.3329	0.3705	0.4574	0.7559
S-ATT.-F	0.2549	0.0289	-0.1085	-0.1759	-0.2674	0.0405	-0.1879	-0.2203	-0.2647	0.1661
S-ATT.-S	0.4190	0.2173	0.0509	-0.1209	-0.0594	-0.0477	0.0112	-0.0751	-0.2049	0.2809
S-EXP.-F	0.0835	-0.3800	-0.2327	-0.1010	-0.0344	-0.0834	0.0074	0.0040	-0.1546	0.0000
S-EXP.-S	0.0407	0.0322	-0.0169	0.0354	0.1074	0.1025	0.1255	0.2631	0.0061	0.3780
CAT RCMP	0.0999	0.1888	0.0994	0.2468	0.1670	0.0202	-0.0606	0.0689	-0.0755	0.3238
READ APP	-0.0019	0.2528	0.2697	0.0848	0.1600	0.1487	0.1040	0.2639	0.1472	-0.0106
DECODING	-0.0874	-0.0846	-0.0477	-0.1616	0.0679	-0.1120	-0.2448	0.1490	0.0620	-0.2774
READ ACH	0.1115	0.3152	0.0317	-0.0236	-0.0373	-0.0944	-0.1343	-0.0354	-0.2017	-0.0600
TOT READ	0.1097	0.3845	0.2016	0.0857	0.0859	0.0132	-0.0251	0.1359	-0.0722	0.0012
PSEUDO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Final Structural Analysis
Grade 5 Reading (continued)

CORRELATIONS

	S COGSTY	S-ATT.-F	S-ATT.-S	S-EXP.-F	S-EXP.-S	CAT ACMP	READ APP	DECODING	READ ACH	T.T [illegible]
WD-----1	-0.1237	-0.1396	-0.0157	0.0755	0.0366	-0.1958	0.0382	0.0775	-0.1799	[illegible]
WD-----2	0.0269	0.0474	0.2888	0.0552	0.0852	0.0441	0.1388	0.1270	-0.0185	0. [illegible]
WD-----3	-0.1576	0.0227	-0.0035	-0.1099	-0.2091	0.0395	-0.0087	0.1359	-0.1906	-0.1299
WD-----4	-0.1919	-0.1872	-0.0036	-0.1242	0.0417	0.1595	0.2138	0.2667	-0.0198	0.1792
WD-----5	0.1732	0.1259	0.0715	-0.0898	-0.0235	0.0609	-0.1565	-0.2747	-0.1114	-0.1203
RAMOS--1	-0.0300	0.0819	-0.2187	0.0681	-0.0237	-0.2430	-0.1205	0.0426	0.0135	-0.1561
RAMOS--2	0.0345	0.3683	-0.0700	0.1670	-0.0123	-0.0000	-0.0897	-0.0770	-0.2631	-0.1406
RAMOS--3	-0.1094	0.1889	-0.0760	0.3582	-0.0144	-0.1238	-0.3177	-0.2766	-0.0937	-0.2365
RAMOS--4	0.1272	-0.0302	0.0265	-0.0656	-0.3954	0.0440	-0.1319	-0.0755	0.0069	-0.0324
APPLE--1	-0.1996	-0.1749	0.1394	0.1129	0.0170	0.0315	0.0223	0.0650	0.0186	-0.0127
APPLE--2	0.1150	0.0073	-0.1097	-0.0738	-0.1688	-0.1774	-0.1873	0.0514	-0.0114	-0.1788
APPLE--3	0.0545	-0.1471	0.0716	-0.1501	-0.1032	0.2303	-0.0372	-0.0992	0.0350	0.0429
APPLE--5	0.1056	-0.2088	-0.1217	-0.1542	-0.1833	-0.1685	-0.0363	0.1220	0.1004	-0.0697
APPLE--6	-0.2372	-0.0610	-0.1406	-0.0104	-0.2233	0.0821	0.0212	0.1097	-0.0267	-0.0179
APPLE--7	0.2001	0.1325	0.3271	-0.1736	0.0126	0.1652	-0.0763	-0.3156	0.0716	0.0529
APPLE--8	0.0539	0.2579	0.1060	0.0876	-0.0242	-0.0264	-0.2433	-0.0651	-0.1846	-0.2777
APPLE--9	-0.1237	-0.1951	-0.0809	-0.2592	-0.3455	-0.1071	0.1267	0.1090	0.2650	0.1236
APPLE-10	0.2585	-0.0207	0.0768	-0.0802	0.0935	0.2141	0.0486	0.0192	0.1080	0.1792
APPLE-11	0.0339	0.1646	-0.1427	-0.0177	-0.0678	-0.0777	0.0810	-0.1376	0.0640	0.0237
APPLE-12	-0.1277	0.0326	0.1006	-0.0973	-0.2072	-0.0866	-0.0159	-0.0298	-0.0695	-0.1601
APPLE-13	-0.0286	-0.2539	-0.1373	-0.1576	-0.1085	-0.0929	-0.2461	-0.0619	0.0655	-0.1773
APPLE-14	-0.0562	-0.1132	0.1054	-0.0267	-0.0382	0.1474	-0.1586	-0.0634	-0.1023	-0.1214
TCH--SEA	-0.1982	0.2103	0.0635	0.0721	-0.0540	-0.1906	-0.0323	0.0023	0.0439	-0.0458
TCH--AGE	0.1909	0.0825	0.1119	0.0544	0.0797	0.3334	0.0019	0.0491	0.0412	0.0992
I-ASSIM	0.3538	0.0006	-0.0404	0.0550	0.0306	-0.1961	-0.1059	-0.2043	-0.0522	-0.0468
I-ASTCH	0.1870	-0.0191	0.0703	0.1642	0.0928	-0.1905	-0.0264	-0.0931	0.0301	0.0378
I-ED.LEV	0.0711	0.2865	0.3005	0.0194	0.1693	0.2785	0.0596	-0.0010	0.0135	0.1154
EX-T & A	-0.0474	0.1378	0.1279	0.1605	0.0770	0.0940	0.1911	0.2176	-0.3026	-0.0142
DIS.FUND	-0.0481	0.0052	0.0560	-0.1007	0.0114	0.2251	0.3759	0.0204	0.2727	0.4071
PRI-CHG	-0.0006	-0.0127	0.0620	-0.0758	0.1800	0.1646	0.2878	0.1021	0.1223	0.2953

Final Structural Analysis
Grade 5 Reading (continued)

CORRELATIONS

	S COGSTY	S-ATT.-F	S-ATT.-S	S-EXP.-F	S-EXP.-S	CAT KCMP	READ APP	DECODING	READ ACH	TOT READ
INS.CLSP	0.0578	0.0930	0.1235	0.0287	0.1959	-0.0850	0.1638	0.1447	-0.0756	0.1354
TEACHING	0.0190	0.2558	0.1537	0.0937	-0.0067	0.0471	0.1658	0.0051	-0.1435	0.0879
CONCEPTS	0.0137	0.2006	0.0930	0.2720	0.0830	-0.0631	-0.0257	-0.1377	0.0586	0.0548
DEPTRMED	0.0026	0.1591	0.2367	-0.0635	-0.1588	0.0645	-0.1768	0.0240	0.2090	-0.0001
PRIMHELP	0.0788	-0.0827	-0.0523	0.0091	0.1451	-0.0330	-0.0487	0.0116	-0.0316	-0.0741
S. STYLE	0.3230	0.0486	0.0344	-0.2583	0.0995	0.1073	0.1808	-0.0396	0.0180	0.1786
P. STYLE	0.1482	0.0118	-0.0208	-0.1438	0.0625	0.0699	-0.1170	-0.1312	-0.0956	-0.0991
PSTYLE-T	0.0131	0.1129	0.2029	0.0055	-0.0087	0.1304	-0.0832	-0.0422	-0.0487	-0.0543
CLASS CL	-0.0179	0.1653	0.2814	0.1745	0.3324	0.1219	-0.0595	0.0414	0.2356	0.1169
ASSIGNAT.	-0.1433	0.1106	0.0761	0.0260	0.1313	0.1381	-0.0668	-0.1250	0.0107	0.0431
SATISFCT	0.1169	0.2549	0.4190	0.0835	0.0407	0.0999	-0.0019	-0.0874	0.1115	0.1397
T.P.STUD	0.3540	0.0289	0.2173	-0.3800	0.0322	0.1888	0.2528	-0.0846	0.3152	0.3845
TEACH.KN	0.3021	-0.1685	0.0509	-0.2327	-0.0169	0.0994	0.2697	-0.0477	0.0317	0.2016
SUBJECTK	0.3476	-0.1759	-0.1209	-0.1010	0.0394	0.2468	0.0848	-0.1616	-0.0236	0.0857
VERB.FL.	0.3973	-0.2674	-0.0594	-0.0344	0.1694	0.1670	0.1600	0.0679	-0.0373	0.0859
MEMORY	0.0904	0.0405	-0.0477	-0.0834	0.1025	0.0202	0.1687	-0.1120	-0.0945	0.1152
READING	0.3329	-0.1879	0.0112	0.0094	0.1255	-0.0606	0.1040	-0.2448	-0.1343	-0.0251
FLEXIBLE	0.3705	-0.2203	-0.0751	0.0040	0.2631	0.0689	0.2639	0.1490	-0.0354	0.1359
T COGSTY	0.4574	-0.2647	-0.2049	-0.1348	0.0661	-0.0755	0.1472	0.0620	-0.2017	-0.0722
SFTAA	0.7389	0.1601	0.2809	0.0004	0.3280	0.3238	-0.0106	-0.2774	-0.0900	0.0012
S COGSTY	1.0000	-0.0784	0.0930	-0.1646	0.2809	0.2907	0.0908	-0.1676	0.0290	0.1576
S-ATT.-F	-0.0784	1.0000	0.4107	0.4482	0.2559	-0.0377	-0.0928	-0.1640	-0.0687	-0.0740
S-ATT.-S	0.0930	0.4107	1.0000	0.2307	0.3723	0.2143	0.1390	-0.1667	0.0769	0.2155
S-EXP.-F	-0.1646	0.4482	0.2307	1.0000	0.5102	-0.0663	-0.2841	-0.1655	-0.2121	-0.2616
S-EXP.-S	0.2809	0.2559	0.3723	0.5102	1.0000	0.2388	0.0533	0.0593	-0.2089	0.0283
CAT KCMP	0.2907	-0.0377	0.2143	-0.0663	0.2388	1.0000	0.1780	-0.0510	0.0978	0.4971
READ APP	0.0908	-0.0928	0.1390	-0.2841	0.0533	0.1780	1.0000	0.4327	0.2221	0.7842
DECODING	-0.1676	-0.1640	-0.1667	-0.1655	0.0593	-0.0510	0.4327	1.0000	0.1047	0.2866
READ ACH	0.0290	-0.0687	0.0769	-0.2121	-0.2089	0.0978	0.2221	0.1047	1.0000	0.6579
TOT READ	0.1576	-0.0740	0.2155	-0.2616	0.0283	0.4971	0.7842	0.2866	0.6579	1.0000
PSEUDO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Final Structural Analysis
Grade 2 Math

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CORRELATIONS

	WD-----1	WD-----2	WD-----3	WD-----4	WD-----5	RAMUS--1	RAMUS--2	RAMUS--3	RAMUS--4	APPLE--1
WD-----1	1.0000	0.3051	-0.1184	0.3769	0.0136	0.0974	-0.0233	-0.0249	0.0911	-0.0191
WD-----2	0.3051	1.0000	0.1291	0.3663	0.1565	-0.0303	-0.0650	-0.0754	0.1151	0.0529
WD-----3	-0.1184	0.1291	1.0000	0.0951	0.1953	-0.1232	-0.0244	-0.0117	0.0746	-0.0176
WD-----4	0.3769	0.3663	0.0951	1.0000	0.1394	0.1543	0.0080	0.1711	0.0803	-0.1768
WD-----5	0.0136	0.1565	0.1953	0.1394	1.0000	0.0466	-0.0254	0.1342	-0.1070	-0.0630
RAMUS--1	0.0974	-0.0303	-0.1232	0.1543	0.0466	1.0000	0.6177	0.7292	0.6116	0.0286
RAMUS--2	-0.0233	-0.0650	-0.0244	0.0080	-0.0254	0.6177	1.0000	0.7258	0.5173	0.3050
RAMUS--3	-0.0249	-0.0754	-0.0117	0.1711	0.1342	0.7292	0.7258	1.0000	0.4977	0.0710
RAMUS--4	0.0911	0.1151	0.0746	0.0803	-0.1070	0.6116	0.5173	0.4977	1.0000	0.0461
APPLE--1	-0.0191	0.0529	-0.0176	-0.1768	-0.0630	0.0286	0.3050	0.0710	0.0461	1.0000
APPLE--2	0.0335	-0.0243	0.1170	0.0173	-0.1046	0.1206	0.0680	0.1883	0.1203	-0.2515
APPLE--3	-0.1033	0.1198	-0.0166	-0.2001	-0.0715	-0.0094	0.1052	0.2138	0.2402	-0.3068
APPLE--5	-0.1483	-0.1548	0.2558	0.0140	-0.0993	0.1943	-0.0086	0.1667	0.2264	-0.2764
APPLE--6	-0.0293	-0.0453	0.1211	-0.3887	-0.2361	-0.1198	-0.0767	-0.2445	-0.2165	0.2852
APPLE--7	-0.0302	0.1901	-0.0588	0.0234	0.1782	-0.0670	0.1855	0.2109	0.0504	0.2463
APPLE--8	-0.1712	-0.0106	0.0839	-0.1684	-0.2640	-0.0939	-0.0275	-0.0482	0.0249	0.1215
APPLE--9	-0.1268	0.2137	-0.0213	-0.2020	0.0233	0.0305	0.0238	-0.0359	-0.0780	0.1852
APPLE-10	-0.2787	-0.2858	-0.0522	-0.1703	-0.1746	0.0390	0.0228	0.1256	0.1317	-0.0360
APPLE-11	0.3710	0.2692	-0.1372	0.1492	-0.1231	0.0579	0.1524	0.1047	0.2487	-0.0717
APPLE-12	-0.0332	0.2227	-0.1064	-0.1983	-0.0637	-0.0935	-0.1080	-0.1110	-0.1937	0.3005
APPLE-13	-0.1698	-0.0295	0.1683	-0.0044	-0.0211	0.1152	0.1584	0.1525	0.1517	0.3811
APPLE-14	-0.2760	-0.2042	0.0901	-0.0802	-0.0087	0.0724	0.2956	0.2123	0.2099	0.1083
TCH--SEX	-0.1436	0.0602	0.2316	-0.0061	-0.2016	0.1469	0.2704	0.2251	0.2874	0.2099
TCH--AGE	-0.3265	-0.2894	-0.0322	-0.0067	0.0309	0.1273	0.3080	0.2894	0.2104	-0.0696
T-YRSSCH	-0.5561	-0.1071	0.1294	-0.2329	0.0342	-0.2216	0.0530	0.1225	-0.1971	0.0605
T-YRSTCH	-0.1064	-0.3373	-0.2607	-0.2030	-0.0797	0.1926	0.3175	0.2205	0.2556	0.1085
T-ED.LEV	0.1198	-0.2910	0.0393	0.1058	0.0143	-0.1140	0.0836	0.0111	-0.2310	-0.0264
EX-T & A	0.0464	-0.0605	0.2779	-0.1340	0.0666	-0.2650	-0.2650	-0.3173	-0.2365	0.0245
DIS.FUND	0.0339	-0.2092	-0.0842	0.0753	0.1919	0.0099	0.0257	-0.0621	-0.0735	-0.1205
PRIN-CHG	0.1466	0.1391	0.3092	0.1452	0.2366	-0.0160	-0.2740	-0.0649	-0.0123	-0.1441

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Final Structural Analysis
Grade 2 Math (continued)

	[illegible]-1	[illegible]-2	[illegible]-3	[illegible]-4	[illegible]-5	[illegible] 1	RAMOS--2	RAMOS--3	RAMOS--4	APPLE--1
INS.COMP	0.3766	0.2290	-0.0499	-0.0308	0.1773	0.0362	-0.0630	-0.0918	-0.0723	-0.0214
TEAMING	0.1523	-0.0285	-0.1371	-0.2476	0.1798	-0.0431	-0.1827	-0.2749	-0.1086	-0.2280
CONCENUS	0.1341	-0.2119	-0.1680	0.0965	-0.2839	0.0963	0.0629	0.0815	-0.0291	-0.2374
CENTRALD	0.0000	0.0846	-0.0218	0.2616	0.1126	0.1391	0.1857	0.1939	0.1564	0.0134
PRINHELP	-0.0889	-0.0588	0.1150	-0.2283	0.1398	0.1016	0.0587	0.0047	0.0033	0.2772
S. STYLE	-0.1077	0.1980	0.3438	-0.0011	0.0824	-0.0247	-0.1011	-0.0067	0.0617	0.0942
P. STYLE	-0.1594	0.0765	0.0678	0.1048	0.0122	0.0399	-0.1165	-0.1171	-0.0989	0.1084
PSTYLE-T	-0.3758	-0.3161	0.1209	-0.1591	-0.1143	0.2258	0.3945	0.2944	0.2721	0.0701
CLASS CL	0.1467	-0.0390	0.2658	0.0093	0.2536	0.2071	0.3018	0.1046	0.1979	0.0533
ASPIRAT.	0.2404	-0.1202	-0.1029	0.1965	0.3852	0.1411	0.1396	0.1762	0.1735	-0.0643
SATISFCT	-0.1631	-0.0560	0.0486	-0.1584	0.1555	0.2382	0.2865	0.2642	0.2748	0.1034
T.P.STUD	-0.1241	-0.0136	0.2522	0.0061	0.1453	0.3801	0.2807	0.2945	0.1931	0.1553
TEACH.KN	-0.0975	-0.0451	0.1133	-0.0241	-0.0500	0.0256	0.0114	-0.1584	-0.1945	0.2130
SUBJECTK	-0.0411	-0.2189	0.1144	-0.0951	0.1558	-0.0540	-0.0105	-0.0403	-0.1863	-0.0708
VERB.FL.	0.0986	0.0875	0.1671	-0.0881	0.1805	0.0170	-0.0220	-0.1123	-0.1522	0.0398
MEMORY	0.4085	0.0571	-0.0964	-0.0032	-0.0512	-0.0100	-0.2961	-0.2010	-0.0089	-0.0964
REASONNG	0.0149	0.1169	-0.1390	-0.0754	0.1153	0.1799	-0.0692	-0.0041	-0.0871	0.0100
FLEXIBLE	0.1507	0.1220	0.0485	-0.0486	-0.0798	-0.0717	-0.2116	-0.3093	-0.2102	0.0555
T COGSTY	-0.0264	-0.0161	0.0797	-0.2436	0.0028	-0.2443	-0.2989	-0.3276	-0.3005	-0.0120
SFTAA	-0.0634	0.3427	0.0693	-0.0538	0.1661	0.1797	0.1978	0.1113	0.1257	-0.0214
[illegible]	[illegible]	0.2222	0.1496	[illegible]	0.2818	0.1453	-0.0737	0.0142	-0.0207	-0.2659
[illegible]	[illegible]	0.0149	-0.1638	-0.0896	-0.0457	-0.1507	-0.1229	-0.2367	-0.1531	-0.0382
[illegible]	-0.0907	-0.0707	-0.2001	-0.1341	-0.1632	-0.2317	-0.2622	-0.2952	-0.0526	0.0317
S-CAP.-T	0.2236	-0.0128	-0.1549	0.1375	0.1452	0.2943	0.2740	0.2838	0.1731	-0.1765
S-EXP.-S	-0.0152	0.1600	-0.1456	-0.0994	-0.0277	0.3371	0.4564	0.3228	0.3006	0.2151
[illegible]	0.0210	0.1418	0.2090	0.0145	0.1525	0.0790	0.0076	0.0379	0.1590	-0.0056
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.1336	-0.1587	-0.2225	-0.4153	-0.3876	-0.0696
[illegible]	0.0533	-0.0391	0.2279	-0.0116	0.0829	-0.1403	-0.2362	-0.0662	0.0177	-0.0711
[illegible]	-0.0592	-0.0252	0.0396	-0.1929	0.0241	-0.1340	-0.2860	-0.2805	-0.2156	-0.0824
BLANK	[illegible]	[illegible]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PSEUDO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Final Structural Analysis
Grade 2 Math (continued)

CORRELATIONS

	APPLE--2	APPLE--3	APPLE--5	APPLE--6	APPLE--7	APPLE--8	APPLE--9	APPLE-10	APPLE-11	APPLE-12
WD-----1	0.0335	-0.1033	-0.1483	-0.0293	-0.0362	-0.1712	-0.1238	-0.2787	0.3710	-0.0332
WD-----2	-0.0243	0.1198	-0.1548	-0.0453	0.1901	-0.0106	0.2137	-0.2658	0.2692	0.2227
WD-----3	0.1170	-0.0166	0.2558	0.1211	-0.0588	0.0839	-0.0213	-0.0522	-0.1372	-0.1054
WD-----4	0.0173	-0.2001	0.0140	-0.3887	0.0234	-0.1684	-0.2020	-0.1703	0.1492	-0.1983
WD-----5	-0.1046	-0.0715	-0.0993	-0.2361	0.1782	-0.2640	0.0233	-0.1746	-0.1231	-0.0637
RAMOS--1	0.1206	-0.0094	0.1943	-0.1198	-0.0670	-0.0939	0.0005	0.0390	0.0579	-0.0935
RAMOS--2	0.0680	0.1052	-0.0086	-0.0767	0.1855	-0.0275	0.0238	0.0228	0.1524	-0.1080
RAMOS--3	0.1883	0.2138	0.1667	-0.2445	0.2109	-0.0482	-0.0359	0.1256	0.1047	-0.1110
RAMOS--4	0.1203	0.2402	0.2264	-0.2165	0.0504	0.0249	-0.0780	0.1317	0.2487	-0.1937
APPLE--1	-0.2515	-0.3068	-0.2764	0.2852	0.2463	0.1215	0.0652	-0.0860	-0.0717	0.3005
APPLE--2	1.0000	-0.0468	0.4597	0.0556	-0.1486	0.1166	-0.3830	-0.0902	0.1189	-0.2338
APPLE--3	-0.0468	1.0000	0.0905	-0.1321	0.3184	0.2794	0.3614	0.2631	0.2482	0.0208
APPLE--5	0.4597	0.0905	1.0000	0.0082	-0.4504	0.1412	-0.2785	-0.2068	0.0222	-0.3446
APPLE--6	0.0556	-0.1321	0.0082	1.0000	-0.4768	0.2674	-0.1948	-0.0791	-0.2059	0.2986
APPLE--7	-0.1486	0.3184	-0.4504	-0.4768	1.0000	0.1280	0.5375	0.1798	0.1833	0.1073
APPLE--8	0.1166	0.2794	0.1412	0.2674	0.1280	1.0000	0.1807	0.1173	-0.1570	0.0373
APPLE--9	-0.3830	0.3614	-0.2785	-0.1948	0.5375	0.1807	1.0000	0.2345	-0.1531	0.3615
APPLE-10	-0.0902	0.2631	-0.2068	-0.0791	0.1798	0.1173	0.2345	1.0000	-0.2248	0.0928
APPLE-11	0.1189	0.2482	0.0222	-0.2059	0.1833	-0.1570	-0.1531	-0.2248	1.0000	-0.2262
APPLE-12	-0.2338	0.0208	-0.3446	0.2986	0.1073	0.0373	0.3615	0.0928	-0.2262	1.0000
APPLE-13	0.1634	-0.2476	-0.0422	0.2587	0.1795	0.1719	0.0001	-0.0291	-0.0211	-0.0120
APPLE-14	0.2213	0.2442	0.1832	-0.2134	0.3399	0.1767	0.0602	0.1198	0.1265	-0.2733
TCH--SEX	0.2245	0.0324	0.0804	-0.0028	0.2166	0.0420	0.0961	0.1291	0.1215	0.2099
TCH--AGE	-0.2978	0.1331	-0.1374	-0.4138	0.1555	-0.2945	0.1298	0.0940	0.1065	-0.0596
T-YRSSCH	-0.0876	0.2805	0.0141	-0.1058	0.3002	0.0542	0.2253	0.1273	0.0562	0.2048
T-YRSTCH	-0.3327	0.1368	-0.1112	-0.3885	0.2533	-0.0384	0.3447	0.1537	0.1591	0.0014
T-ED.LEV	-0.1131	-0.0848	-0.1542	0.0758	0.0044	-0.0996	-0.2171	-0.0166	-0.0087	0.0391
EX-T & A	-0.0952	-0.1909	-0.0990	0.1283	-0.1909	-0.1323	-0.0796	-0.1052	-0.0695	-0.0806
DIS.FUND	-0.2256	-0.3495	-0.1719	-0.1204	-0.0654	-0.2033	-0.0505	0.0072	-0.2432	-0.2321
PRIN-CHG	0.0919	-0.2519	0.0888	0.0839	-0.1409	0.1107	-0.1625	0.1426	-0.3722	0.0908

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Final Structural Analysis
Grade 2 Math (continued)

CORRELATIONS

	APPLE--2	APPLE--3	APPLE--5	APPLE--6	APPLE--7	APPLE--8	APPLE--9	APPLE-10	APPLE-11	APPLE-12
S. STYLE	-0.1374	-0.0436	0.0284	0.0751	-0.2016	0.0162	-0.0775	0.1645	-0.2679	0.3138
P. STYLE	-0.4898	-0.0686	0.0573	0.0476	-0.2226	-0.0429	0.0457	-0.1125	-0.1600	0.0999
PSTYLE-T	-0.0716	-0.0613	-0.1114	0.0922	-0.1453	-0.1143	0.0272	0.2000	-0.1531	0.0345
CLASS CL	0.0377	-0.0698	-0.0883	0.0533	-0.0567	-0.2135	-0.2633	-0.1676	0.1068	-0.0836
ASPIRAT.	-0.1429	-0.1702	-0.1872	-0.1720	0.1132	-0.1156	-0.1725	-0.0982	-0.1028	-0.0131
SATISFCT	-0.1526	0.0645	-0.2401	-0.0519	0.0485	-0.2426	0.1073	0.0267	-0.1294	0.1150
T.P.STUD	0.0751	0.1116	0.3364	-0.0078	-0.0360	0.0427	0.1231	-0.1602	-0.0311	0.1414
TEACH.KN	0.1134	-0.3891	-0.1262	0.6623	-0.3254	0.0612	-0.2393	-0.1525	-0.3042	0.0503
SUBJECTK	0.3774	-0.1991	0.2538	0.2089	-0.2861	-0.0362	-0.4597	-0.1338	-0.0428	-0.3754
VERS.FL.	0.0780	-0.1648	-0.0961	0.3681	-0.0398	-0.1104	0.0044	-0.2319	-0.0242	0.0238
MEMORY	0.0425	-0.0047	-0.1258	0.2714	-0.0897	0.0982	-0.1347	0.1327	0.0892	0.1045
REASONNG	0.0557	-0.1216	0.0350	0.3223	-0.2642	0.1179	-0.1082	-0.0813	-0.2022	0.0007
FLEXIBLE	0.0561	-0.0517	-0.1176	0.4800	-0.1223	-0.0776	-0.0398	-0.0976	-0.0646	0.0233
T COGSTY	-0.0589	-0.0891	-0.0358	0.3763	-0.0801	0.0872	-0.1991	-0.0787	-0.0142	-0.0325
SFTAA	0.1114	0.1987	-0.0181	-0.1947	0.2314	-0.3011	0.2454	-0.1104	0.1705	0.1395
S COGSTY	-0.0406	0.2662	0.0843	-0.0408	0.0406	-0.1055	0.1743	-0.1486	-0.0182	0.0032
S-ATT.-F	-0.3321	-0.0911	-0.4720	-0.0215	0.1951	0.0062	0.2692	0.0706	0.1217	-0.0152
S-ATT.-S	-0.2082	-0.0930	-0.2228	0.0621	0.0313	0.0258	0.1470	0.0042	-0.0402	0.0479
S-EXP.-F	0.0766	0.0307	0.0168	-0.2103	0.0583	-0.2946	-0.0680	-0.0505	0.2151	-0.3253
S-EXP.-S	0.1603	0.0784	-0.0530	-0.1090	0.3533	0.0359	0.3510	-0.1064	0.2644	0.0122
CAT MCMP	-0.1825	0.2090	-0.0471	-0.0558	-0.0113	-0.1323	-0.0266	-0.0729	0.4238	-0.0736
CAT MCUM	-0.1893	-0.1852	-0.1213	0.2141	-0.1828	0.0697	-0.0587	-0.2207	-0.2096	-0.0682
MATH APL	-0.0743	-0.0320	0.0644	-0.0964	-0.2407	-0.2743	-0.2839	-0.0153	-0.0827	-0.1896
MATH TOT	-0.2247	-0.0959	-0.0283	0.0514	-0.2744	-0.1925	-0.2146	-0.1834	-0.0573	-0.1684
BLANK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PSEUDO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Final Structural Analysis
Grade 2 Math (continued)

CORRELATIONS

	APPLE-13	APPLE-14	TCH--SEX	TCH--AGE	T-YRSSCH	T-YRSTCH	T-ED.LEV	EX-T & A	DIS.FUND	PRIN-CHG
WD-----1	-0.1698	-0.2760	-0.1436	-0.3265	-0.5561	-0.1004	0.1158	0.0464	0.0339	0.1466
WD-----2	-0.0295	-0.2042	0.0602	-0.2894	-0.1071	-0.3373	-0.2910	-0.0605	-0.2092	0.1391
WD-----3	0.1683	0.0901	0.2316	-0.0322	0.1294	-0.2267	0.0393	0.2779	-0.0842	0.3092
WD-----4	-0.0044	-0.0802	-0.0061	-0.0067	-0.2329	-0.2050	0.1058	-0.1340	0.0753	0.1452
WD-----5	-0.0211	-0.0087	-0.2616	0.0809	0.0342	-0.0797	0.0143	0.0666	0.1919	0.2366
RAMOS--1	0.1152	0.0724	0.1469	0.1273	-0.2216	0.1926	-0.1140	-0.2850	0.0099	-0.0160
RAMOS--2	0.1584	0.2956	0.2704	0.3080	0.0530	0.3175	0.0836	-0.2650	0.0257	-0.2740
RAMOS--3	0.1525	0.2123	0.2251	0.2894	0.1225	0.2205	0.0111	-0.3173	-0.0621	-0.0649
RAMOS--4	0.1517	0.2099	0.2874	0.2104	-0.1971	0.2556	-0.2310	-0.2365	-0.0735	-0.0123
APPLE--1	0.3811	0.1083	0.2099	-0.0696	0.0505	0.1085	-0.0264	0.0245	-0.1205	-0.1441
APPLE--2	0.1634	0.2213	0.2245	-0.2978	-0.0870	-0.3327	-0.1031	-0.0952	-0.2256	0.0919
APPLE--3	-0.2476	0.2442	0.0324	0.1331	0.2805	0.1368	-0.0648	-0.1909	-0.3495	-0.2519
APPLE--5	-0.0422	0.1832	0.0804	-0.1374	0.0141	-0.1112	-0.1542	-0.0990	-0.1719	0.0888
APPLE--6	0.2587	-0.2134	-0.0028	-0.4138	-0.1058	-0.3885	0.0758	0.1283	-0.1204	0.0839
APPLE--7	0.1795	0.2399	0.2166	0.1555	0.3002	0.2533	0.0044	-0.1909	-0.0654	-0.1409
APPLE--8	0.1719	0.1767	0.0420	-0.2945	0.0542	-0.0384	-0.0996	-0.1323	-0.2033	0.1107
APPLE--9	0.0001	0.0602	0.0961	0.1298	0.2253	0.3447	-0.2171	-0.0796	-0.0505	-0.1625
APPLE-10	-0.0291	0.1198	0.1291	0.0940	0.1273	0.1537	-0.0166	-0.1052	0.0072	0.1426
APPLE-11	-0.0211	0.1265	0.1215	0.1065	0.0502	0.1591	-0.0087	-0.0695	-0.2432	-0.3722
APPLE-12	-0.0120	-0.2733	0.2099	-0.0596	0.2048	0.0014	0.0391	-0.0876	-0.2321	0.0908
APPLE-13	1.0000	0.0734	0.3434	0.0347	-0.0560	-0.0157	0.0477	0.0743	-0.0818	0.1299
APPLE-14	0.0734	1.0000	0.2687	0.1483	0.1884	0.2189	0.0773	-0.1307	-0.1875	-0.3919
TCH--SEX	0.3434	0.2687	1.0000	0.1350	0.3441	0.2178	0.1592	-0.0766	-0.3489	-0.1855
TCH--AGE	0.0347	0.1483	0.1350	1.0000	0.4413	0.6924	0.0105	0.1110	0.1435	-0.1756
T-YRSSCH	-0.0560	0.1884	0.3441	0.4413	1.0000	0.3857	0.1368	-0.0873	-0.1774	-0.2842
T-YRSTCH	-0.0157	0.2189	0.2178	0.6924	0.3857	1.0000	0.1014	-0.0363	-0.0596	-0.3837
T-ED.LEV	0.0477	0.0773	0.1592	0.0105	0.1368	0.1014	1.0000	-0.0789	-0.0179	-0.0857
EX-T & A	0.0243	-0.1307	-0.0766	0.1110	-0.0873	-0.0363	-0.0789	1.0000	0.1455	0.0928
DIS.FUND	-0.0818	-0.1875	-0.3489	0.1435	-0.1774	-0.0596	-0.0179	0.1455	1.0000	0.3220
PRIN-CHG	0.1299	-0.3919	-0.1855	-0.1756	-0.2842	-0.3837	-0.0857	0.0928	0.3220	1.0000

Final Structural Analysis
Grade 2 Math (continued)

CORRELATIONS

	APPLE-13	APPLE-14	TCH--SEX	TCH--AGE	T-YRSSCH	T-YRSTCH	T-ED.LEV	EX-T & A	DIS.FUND	PRIN-CHG
S. STYLE	-0.0596	-0.2671	0.0314	0.1186	0.0048	-0.0047	-0.1175	0.2242	-0.2552	0.5791
P. STYLE	-0.0039	-0.2462	-0.2735	0.1854	0.0258	0.0019	-0.1299	0.1902	0.1659	0.2329
PSTYLE-T	0.2707	0.1155	0.0319	0.5031	0.1194	0.3351	0.0023	0.2097	0.2198	-0.3649
CLASS CL	0.1417	-0.0312	-0.0151	0.0391	-0.1328	0.0092	0.5955	0.1050	0.1296	0.1263
ASPIRAT.	0.1134	-0.1659	-0.0062	0.1153	-0.2994	0.1250	0.2880	-0.1865	0.2247	0.1420
SATISFCT	0.0719	-0.1229	-0.0610	0.2151	0.0991	0.1759	0.1599	-0.0928	0.2383	-0.1923
T.P.STUD	-0.0520	0.3204	0.2134	-0.0630	0.0430	0.2097	0.0740	-0.0927	-0.2863	-0.3702
TEACH.KN	0.2212	0.0145	0.0216	-0.2401	-0.2089	-0.4107	0.1293	0.0728	0.1559	0.0044
SUBJECTK	-0.1636	0.2070	-0.1868	-0.2332	-0.0949	-0.3256	0.1748	0.2179	0.1721	-0.0501
VERB.FL.	0.2441	0.0241	-0.0944	-0.2725	-0.3132	-0.3067	-0.0156	0.2696	-0.0179	0.1574
MEMORY	-0.1375	-0.1861	-0.0372	-0.3873	-0.4131	-0.3434	-0.1290	0.2016	0.1083	0.3097
REASONNG	-0.2339	-0.0543	-0.3295	-0.4447	-0.2796	-0.3240	-0.0772	0.0552	0.0691	0.0426
FLEXIBLE	-0.0061	-0.0070	-0.1794	-0.5009	-0.3112	-0.4690	0.0247	0.2654	0.0498	0.1047
T COGSTY	-0.1138	-0.0225	-0.2596	-0.5202	-0.1744	-0.4534	0.0918	0.0682	-0.0740	0.1658
SETAA	-0.0874	-0.0330	-020360	-0.0227	0.0282	-0.0056	-0.0763	-0.0463	-0.0874	-0.1140
S COGSTY	-0.1960	-0.0103	-0.1245	-0.1867	-0.0230	-0.1561	0.0046	-0.1034	-0.0886	-0.0826
S-ATT.-F	0.1870	-0.0171	0.1252	0.3302	-0.0707	0.3218	-0.0211	0.2534	0.1393	-0.1306
S-ATT.-S	0.2285	0.0338	0.2470	0.3525	0.0973	0.2682	-0.0477	0.2458	0.1206	-0.0197
S-EXP.-F	-0.1383	0.1618	-0.2265	-0.1088	-0.3255	-0.0460	0.1495	-0.2660	0.1652	-0.2069
S-EXP.-S	0.3301	0.2530	0.3175	0.0149	-0.0653	0.2184	-0.1374	-0.2199	-0.1959	-0.4493
CAT MCMP	0.0354	-0.0878	0.1051	0.1778	0.0608	0.0783	-0.1889	0.2430	-0.1394	-0.2069
CAT MCOM	-0.1345	-0.1640	-0.3065	0.0352	-0.0372	0.0563	-0.0402	0.1904	0.1621	-0.0286
MATH APL	-0.0699	-0.2236	-0.0343	0.2404	-0.0780	-0.0066	-0.1904	0.5054	0.1027	0.1701
MATH TOT	-0.1302	-0.2047	-0.1599	0.2213	-0.0202	0.0441	-0.1928	0.4983	0.1116	0.0302
BLANK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PSEUDO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Final Structural Analysis
Grade 2 Math (continued)

CORRELATIONS

	INS.COMP	TEAMING	CONSENUS	CENTRALD	PRINHELP	S. STYLE	P. STYLE	PSTYLE-T	CLASS CL	ASPIRAT.
WD-----1	0.3706	0.1523	0.1341	0.0000	-0.0889	-0.1577	-0.1594	-0.3758	0.1467	0.2404
WD-----2	0.2290	-0.0285	-0.2119	0.0846	-0.0568	0.1960	0.0765	-0.3161	-0.0390	-0.1202
WD-----3	-0.0499	-0.1371	-0.1680	-0.0218	0.1150	0.3438	0.0678	0.1209	0.2658	-0.1029
WD-----4	-0.0308	-0.2476	0.0965	0.2616	-0.2283	-0.0011	0.1048	-0.1591	0.0093	0.1965
WD-----5	0.1773	0.1796	-0.2839	0.1126	0.1398	0.0824	0.0122	-0.1143	0.2536	0.3852
RAMOS--1	0.0362	-0.0431	0.0963	0.1391	0.1016	-0.0247	0.0399	0.2258	0.2071	0.1411
RAMOS--2	-0.0633	-0.1827	0.0629	0.1857	0.0587	-0.1011	-0.1165	0.3945	0.3018	0.1596
RAMOS--3	-0.0718	-0.2749	0.0815	0.1939	0.0047	-0.0067	-0.1171	0.2944	0.1046	0.1762
RAMOS--4	-0.0725	-0.1086	-0.0291	0.1564	0.0033	0.0617	-0.0989	0.2721	0.1979	0.1735
APPLE--1	-0.1214	-0.2280	-0.2574	0.0134	0.2772	0.0942	0.1084	0.0701	0.0533	-0.0643
APPLE--2	0.0306	-0.0123	0.2444	-0.1769	0.1198	-0.1874	-0.4858	-0.0716	0.0377	-0.1429
APPLE--3	-0.0910	-0.0936	0.2239	-0.2061	-0.0271	-0.0436	-0.0686	-0.0613	-0.0698	-0.1702
APPLE--5	0.2963	-0.1079	0.2029	-0.2958	0.3006	0.0284	0.0573	-0.1114	-0.0883	-0.1872
APPLE--6	0.2160	0.1489	-0.2096	-0.4633	0.1647	0.0751	0.0476	0.0922	0.0533	-0.1720
APPLE--7	-0.3675	-0.1425	0.1457	0.2790	0.1159	-0.2616	-0.2226	-0.1453	-0.0567	0.1132
APPLE--8	0.0960	0.0523	-0.0885	-0.4597	0.1267	0.0162	-0.0429	-0.1143	-0.2135	-0.1156
APPLE--9	-0.1863	0.2556	0.0730	0.2444	0.0952	-0.0775	0.0457	0.0272	-0.2633	-0.1726
APPLE-10	-0.3984	-0.0142	-0.1591	0.1768	-0.1339	0.1645	-0.1125	0.2000	-0.1616	-0.0982
APPLE-11	-0.0218	-0.2289	0.4333	0.1737	-0.1190	-0.2679	-0.1600	-0.1531	0.1068	-0.1028
APPLE-12	0.0046	0.0555	-0.1610	0.1366	-0.0371	0.3138	0.0299	0.0345	-0.0836	-0.0151
APPLE-13	-0.2526	-0.1885	-0.0808	-0.2299	0.0488	-0.0596	-0.0639	0.2707	0.1417	0.1134
APPLE-14	-0.2626	-0.2868	0.2225	0.0221	0.2835	-0.2671	-0.2462	0.1155	-0.0312	-0.1659
TCH--SEX	-0.2266	-0.2626	0.2417	0.1162	0.2198	0.0314	-0.2735	0.0319	-0.0151	-0.0062
TCH--AGE	-0.2263	-0.0911	0.0702	0.3859	-0.2561	0.1186	0.1854	0.5031	0.0391	0.1153
T-YRSSCH	-0.2602	-0.1711	0.0393	0.1586	0.0316	0.0048	0.0258	0.1194	-0.1326	-0.2794
T-YRSTCH	-0.1292	-0.0106	0.1624	0.3077	-0.1879	-0.0047	0.0019	0.3351	0.0092	0.1250
T-ED.LEV	-0.1120	-0.2506	0.0849	-0.1127	-0.1639	-0.1175	-0.1299	0.0023	0.5955	0.2880
EX-T & A	0.1864	0.2539	-0.1191	-0.1077	-0.1136	0.2242	0.1902	0.2097	0.1050	-0.1865
DIS.BUND	0.0383	0.3984	-0.2779	0.2899	-0.1952	-0.2952	0.1659	0.2198	0.1296	0.2247
PRIN-CHG	0.3860	0.2480	-0.5628	-0.2384	0.0627	0.5791	0.2329	-0.3649	0.1263	0.1420

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Final Structural Analysis
Grade 2 Math (continued)

CORRELATIONS

	INS.COMP	TEAMING	CONSENUS	CENTRALD	PRINCIPLP	S. STYLE	P. STYLE	PSTYLE-T	CLASS CL	ASPIRAT.
INS.COMP	1.0000	0.2538	-0.2464	-0.5340	0.2279	0.3968	0.2883	-0.4810	0.1615	0.0806
TEAMING	0.2538	1.0000	-0.0718	0.0022	-0.0930	-0.2120	-0.0026	0.0097	-0.2331	0.0690
CONSENUS	-0.2464	-0.0718	1.0000,	0.0852	0.1034	-0.5738	-0.2466	-0.0840	-0.3181	-0.0507
CENTRALD	-0.5340	0.0022	0.0852	1.0000	-0.2993	-0.2002	-0.1010	0.4200	-0.1113	0.0667
PRINCIPLP	0.2279	-0.0930	0.1034	-0.2993	1.0000	-0.0319	-0.0704	-0.5025	-0.1610	-0.1002
S. STYLE	0.3968	-0.2120	-0.5738	-0.2002	-0.0319	1.0000	0.5676	-0.1348	0.1886	-0.0020
P. STYLE	0.2883	-0.0026	-0.2466	-0.1010	-0.0704	0.5676	1.0000	-0.0620	-0.0834	-0.2131
PSTYLE-T	-0.4810	0.0097	-0.0840	0.4200	-0.5025	0.1348	-0.0620	1.0000	0.1490	0.0353
CLASS CL	0.1615	-0.2331	-0.3181	-0.1113	-0.1610	0.1886	-0.0834	0.1490	1.0000	0.3851
ASPIRAT.	0.0806	0.0690	-0.0507	0.0667	-0.1002	-0.0020	-0.2131	0.0353	0.3851	1.0000
SATISFCT	-0.2882	-0.2835	-0.2612	0.3578	-0.3446	0.0095	-0.0574	0.5885	0.5542	0.1333
T.P.STUD	0.0958	-0.1656	0.2130	0.0346	0.0625	0.0796	0.1282	0.1811	0.1990	0.0279
TEACH.KN	0.1429	0.1060	-0.0612	-0.1742	0.1742	-0.0952	0.0567	0.1414	-0.0515	-0.0011
SUBJECTK	0.3374	0.0134	-0.0469	-0.3474	0.2019	-0.2073	-0.2457	-0.0292	0.2883	-0.0931
VERB.FL.	0.2422	0.2071	-0.0861	-0.1265	0.1816	0.0114	-0.0311	-0.1138	0.2533	0.0414
MEMORY	0.3918	0.3432	-0.0471	-0.2562	0.1637	0.0522	-0.0722	-0.3985	-0.0600	0.1549
REASONNG	0.4513	0.2320	-0.2525	-0.3602	0.0645	0.0243	0.0598	-0.1012	0.0032	-0.0527
FLEXIBLE	0.2862	0.2430	-0.0203	-0.3772	0.1437	-0.0584	0.1869	-0.2757	0.0646	-0.3081
T COGSTY	0.1032	0.1716	-0.0042	-0.2890	0.2772	0.0096	0.0451	-0.4378	-0.0638	-0.0658
SFTAA	0.0600	0.0527	0.0700	0.1985	-0.0466	-0.0538	0.0177	0.0033	0.3282	-0.1434
S COGSTY	0.0707	0.0636	0.0618	0.0996	0.1094	-0.1359	-0.1071	-0.1480	0.1440	0.0624
S-ATT.-F	-0.0735	0.0600	0.0913	0.0730	-0.0788	-0.0416	-0.0208	0.2194	-0.1215	0.2637
S-ATT.-S	-0.1167	0.0670	0.0474	-0.0317	-0.0052	-0.0468	-0.0625	0.1841	-0.2382	0.0657
S-EXP.-F	-0.0704	0.0185	0.2683	0.2556	0.0102	-0.4598	-0.5230	0.0021	0.1922	0.1342
S-EXP.-S	-0.2371	0.0387	0.3635	0.3240	0.1171	-0.4242	-0.3776	0.1344	-0.0639	0.0139
CAT MCMP	-0.0885	-0.1821	0.2341	0.1523	-0.0722	0.0827	0.1852	0.0806	-0.1042	-0.0774
CAT ACOM	0.2978	0.1750	-0.0422	-0.3040	0.1562	-0.0116	0.1663	-0.0979	-0.0924	0.0267
MATH APL	0.1775	-0.1551	-0.1219	-0.0871	-0.0506	0.2977	0.1092	0.1119	-0.0543	0.0377
MATH TOT	0.2988	-0.0309	-0.0297	-0.1844	0.0725	0.2276	0.2954	0.0006	-0.1499	-0.0309
BLANK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PSEUDO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Final Structural Analysis
Grade 2 Math (continued)

CORRELATIONS

	SATISFCT	T.P.STUD	TEACH.KN	SUBJECTK	VERB.FL.	MEMORY	REASONNG	FLEXIBLE	T COGSTY	SFTAA
WD-----1	-0.1631	-0.1241	-0.0975	-0.0411	0.0986	0.4085	0.0149	0.1507	-0.0264	-0.0554
WD-----2	-0.0560	-0.0136	-0.0451	-0.2189	0.0875	0.0571	0.1169	0.1220	-0.0161	0.3427
WD-----3	0.0486	0.2522	0.1133	0.1144	0.1671	-0.0964	-0.1390	0.0485	0.0797	0.0693
WD-----4	-0.1584	0.0061	-0.0241	-0.0951	-0.0881	-0.0032	-0.0754	-0.0486	-0.2436	-0.0538
WD-----5	0.1555	0.1453	-0.0500	0.1558	0.1805	-0.0512	0.1153	-0.0798	0.0028	0.1061
RAMOS--1	0.2382	0.3801	0.0256	-0.0540	0.0170	-0.0100	0.1799	-0.0717	-0.2443	0.1797
RAMOS--2	0.2865	0.2867	0.0114	-0.0105	-0.0220	-0.2961	-0.0692	-0.2116	-0.2989	0.1978
RAMOS--3	0.2642	0.2945	-0.1584	-0.0403	-0.1123	-0.2010	-0.0041	-0.3093	-0.3276	0.1113
RAMOS--4	0.2748	0.1931	-0.1945	-0.1863	-0.1522	-0.0089	-0.0871	-0.2102	-0.3005	0.1257
APPLE--1	0.1034	0.1553	0.2130	-0.0708	0.0398	-0.0964	0.0100	0.0555	-0.0120	-0.0214
APPLE--2	-0.1526	0.0731	0.0134	0.3774	0.0780	0.0425	0.0557	0.0561	-0.0589	0.1114
APPLE--3	0.0645	0.1116	-0.3891	-0.1991	-0.1648	-0.0047	-0.1216	-0.0517	-0.0891	0.1987
APPLE--5	-0.2401	0.3364	-0.1262	0.2538	-0.0961	-0.1258	0.0350	-0.1176	-0.0358	-0.0161
APPLE--6	-0.0519	-0.0078	0.6623	0.2089	0.3681	0.2714	0.3223	0.4800	0.3763	-0.1947
APPLE--7	0.0485	-0.0360	-0.3254	-0.2861	-0.0398	-0.2897	-0.2642	-0.1223	-0.0861	0.2314
APPLE--8	-0.2426	0.0427	0.0612	-0.0382	-0.1104	0.0982	0.1179	0.0776	0.0872	-0.3011
APPLE--9	0.1073	0.1231	-0.2393	-0.4597	0.0044	-0.1347	-0.1082	-0.0398	-0.1991	0.2454
APPLE-10	0.0207	-0.1602	-0.1525	-0.1338	-0.2319	0.1327	-0.0813	-0.0976	-0.0787	-0.1104
APPLE-11	-0.1294	-0.0311	-0.3042	-0.0428	-0.0242	0.0892	-0.2022	-0.0646	-0.0142	0.1705
APPLE-12	0.1190	0.1414	0.0503	-0.3734	0.0238	0.1045	0.0007	0.0233	-0.0325	0.1395
APPLE-13	0.0719	-0.0520	0.2212	-0.1636	0.2441	-0.1375	-0.2339	-0.0061	-0.1138	-0.0874
APPLE-14	-0.1229	0.3204	0.0145	0.2070	0.0241	-0.1861	-0.0543	-0.0070	-0.0225	-0.0330
TCH--SEX	-0.0610	0.2134	0.0216	-0.1868	-0.0944	-0.0372	-0.3295	-0.1794	-0.2596	-0.0360
TCH--AGE	0.2151	-0.0630	-0.2401	-0.2332	-0.2725	-0.3873	-0.4447	-0.5009	-0.5202	-0.0227
T-YRSSCH	0.0951	0.0430	-0.2089	-0.0949	-0.3132	-0.4131	-0.2796	-0.3112	-0.1744	0.0282
T-YRSTCH	0.1759	0.2097	-0.4107	-0.3256	-0.3057	-0.3434	-0.3240	-0.4690	-0.4534	-0.0056
T-ED.LEV	0.1599	0.0740	0.1293	0.1748	-0.0156	-0.1290	-0.0772	0.0247	0.0918	-0.0763
EX-T & A	-0.0928	-0.0927	0.0728	0.2179	0.2696	0.2016	0.0552	0.2654	0.0682	-0.0463
DIS.FUND	0.2383	-0.2863	0.1559	0.1721	-0.0179	0.1083	0.0691	0.0498	-0.0740	-0.0874
PRIN-CHG	-0.1923	-0.3702	0.0044	-0.0501	0.1574	0.3097	0.0426	0.1047	0.1058	-0.1140

Final Structural Analysis
Grade 2 Math (continued)

CORRELATIONS

	SATISFCT	T.P.STUD	TEACH.KN	SUBJECTK	VERB.FL.	MEMORY	REASONNG.	FLEXIBLE	T COGSTY	SFTAA
INS.COMP	-0.2882	0.0958	0.0420	0.3374	0.2422	0.3918	0.4513	0.2862	0.1032	0.0600
TEAMING	-0.2835	-0.1056	0.1060	0.0134	0.2071	0.3432	0.2320	0.2430	0.1716	0.0527
CONCENUS	-0.2612	0.2130	-0.0612	-0.0469	-0.0861	-0.0471	-0.2525	-0.0203	-0.0042	0.0700
CENTRALD	0.3578	0.0346	-0.1742	-0.3474	-0.1265	-0.2502	-0.3002	-0.3772	-0.2830	0.1985
PRINHELP	-0.3446	0.0625	0.1742	0.2019	0.1816	0.1637	0.0645	0.1437	0.2772	-0.0466
S. STYLE	0.0095	0.0796	-0.0982	-0.2073	0.0114	0.0522	0.0243	-0.0584	0.0096	-0.0538
P. STYLE	-0.0574	0.1282	0.0567	-0.2457	-0.0311	-0.0722	0.0598	0.1869	0.0451	0.0177
PSTYLE-T	0.3885	0.1811	0.1414	-0.0292	-0.1138	-0.3985	-0.1012	-0.2757	-0.4376	0.0033
CLASS CL	0.5542	0.1990	-0.0515	0.2883	0.2533	-0.0600	0.0632	0.0646	-0.0658	0.3282
ASPIRAT.	0.1333	0.0279	-0.0011	-0.0931	0.0414	0.1549	-0.0527	-0.3081	-0.2658	-0.1434
SATISFCT	1.0000	0.1872	-0.0812	-0.1049	-0.1743	-0.4485	-0.0289	-0.2553	-0.3914	0.2321
T.P.STUD	0.1872	1.0000	0.0110	0.1343	0.1551	-0.0982	0.3157	0.1307	-0.0684	0.4942
TEACH.KN	-0.0812	0.0110	1.0000	0.3437	0.3769	0.1905	0.3581	0.5256	0.4048	-0.2809
SUBJECTK	-0.1049	0.1343	0.3437	1.0000	0.3472	0.2793	0.5998	0.4162	0.2879	0.0980
VERB.FL.	-0.1743	0.1551	0.3769	0.3472	1.0000	0.4738	0.4818	0.6747	0.5575	0.3487
MEMORY	-0.4485	-0.0982	0.1905	0.2793	0.4738	1.0000	0.4401	0.5576	0.4067	-0.0398
REASONNG	-0.0289	0.3157	0.3581	0.5998	0.4818	0.4401	1.0000	0.6343	0.4275	0.2726
FLEXIBLE	-0.2553	0.1307	0.5256	0.4162	0.6747	0.5576	0.6343	1.0000	0.6009	0.2655
T COGSTY	-0.3914	-0.0684	0.4048	0.2879	0.5575	0.4067	0.4275	0.6009	1.0000	0.0599
SFTAA	0.2321	0.4942	-0.2809	0.0980	0.3487	-0.0398	0.2726	0.2655	0.0599	1.0000
S COGSTY	0.1365	0.3535	0.0180	0.1728	0.3943	0.0853	0.2975	0.1952	0.3305	0.5026
S-ATT.-F	-0.0045	-0.2672	0.1006	-0.2404	-0.0162	0.0877	-0.1557	-0.1228	-0.1795	-0.2627
S-ATT.-S	-0.0147	-0.4459	0.1303	-0.2763	-0.2825	-0.0704	-0.3440	-0.2273	-0.2952	-0.5223
S-EXP.-F	0.0974	0.1848	0.0463	0.3599	0.2810	0.0714	0.3020	0.1427	0.2427	0.3967
S-EXP.-S	0.0995	0.3102	0.0147	-0.0715	0.2251	-0.1126	0.0205	-0.0497	-0.0242	0.3614
CAT MCMP	0.1764	0.1221	-0.1058	-0.2189	-0.0298	-0.0191	-0.2346	-0.1088	-0.0484	-0.0479
CAT MCOM	-0.1710	-0.2199	0.3229	0.1905	0.0711	0.0452	0.2030	0.1408	0.2552	-0.1175
MATH APL	0.1326	-0.1972	-0.1071	0.0753	-0.1491	0.0162	-0.1643	-0.2078	-0.2009	-0.2198
MATH TOT	-0.0322	-0.1922	0.1219	0.0983	-0.0355	0.0243	-0.0261	-0.0359	0.0097	-0.2057
BLANK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PSEUDO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Final Structural Analysis
Grade 2 Math (continued)

CORRELATIONS

	S CHGSTY	S-ATT.-F	S-ATT.-S	S-EXP.-F	S-EXP.-S	CAT MCMP	CAT MCOM	MATH APL	MATH TOT	BLANK
WD-----1	-0.0568	0.1316	-0.0930	0.2258	-0.0152	0.0219	-0.1541	0.0953	-0.0592	0.0
WD-----2	0.2222	0.0149	-0.0707	-0.0128	0.1600	0.1418	-0.0864	-0.0391	-0.0232	0.0
WD-----3	0.1496	-0.1838	-0.2001	-0.1549	-0.1456	0.2050	-0.2503	0.2279	0.0396	0.0
WD-----4	-0.0566	-0.0896	-0.1341	0.1375	-0.0994	0.0145	-0.3192	-0.0116	-0.1929	0.0
WD-----5	0.2818	-0.0467	-0.1632	0.1452	-0.0277	0.1525	-0.1336	0.0829	0.0241	0.0
RAMOS--1	0.1453	-0.1507	-0.2317	0.2943	0.3371	0.0790	-0.1587	-0.1403	-0.1340	0.0
RAMOS--2	-0.0737	-0.1229	-0.2622	0.2743	0.4564	0.0076	-0.2225	-0.2362	-0.2860	0.0
RAMOS--3	0.0142	-0.2367	-0.2952	0.2838	0.3228	0.0379	-0.4153	-0.0662	-0.2805	0.0
RAMOS--4	-0.0207	-0.1531	-0.0526	0.1731	0.3006	0.1590	-0.3876	0.0177	-0.2156	0.0
APPLE--1	-0.2859	-0.0382	0.0317	-0.1765	0.2151	-0.0056	-0.0606	-0.0711	-0.0824	0.0
APPLE--2	-0.0406	-0.3321	-0.2082	0.0766	0.1603	-0.1825	-0.1893	-0.0743	-0.2247	0.0
APPLE--3	0.2662	-0.0911	-0.0930	0.0307	0.0764	0.2090	-0.1852	-0.0320	-0.0959	0.0
APPLE--5	0.0843	-0.4720	-0.2228	0.0168	-0.0530	-0.0471	-0.1213	0.0644	-0.0283	0.0
APPLE--6	-0.0408	-0.0215	0.0621	-0.2103	-0.1090	-0.0558	0.2141	-0.0964	0.0514	0.0
APPLE--7	0.0400	0.1951	0.0313	0.3583	0.3533	-0.0113	-0.1828	-0.2407	-0.2744	0.0
APPLE--8	-0.1055	0.0082	0.0258	-0.2946	0.0359	-0.1323	0.0697	-0.2743	-0.1925	0.0
APPLE--9	0.1743	0.2692	0.1470	-0.0680	0.3510	-0.0266	-0.0587	-0.2839	-0.2146	0.0
APPLE-10	-0.1486	0.0706	0.0042	-0.0505	-0.1064	-0.0729	-0.2207	-0.0153	-0.1834	0.0
APPLE-11	-0.0162	0.1217	-0.0402	0.2151	0.2644	0.4238	-0.2096	-0.0627	-0.0573	0.0
APPLE-12	0.0052	-0.0152	0.0479	-0.3253	0.0122	-0.0736	-0.0682	-0.1896	-0.1684	0.0
APPLE-13	-0.1960	0.1870	0.2285	-0.1383	0.3301	0.1354	-0.1345	-0.0699	-0.1302	0.0
APPLE-14	-0.0103	-0.0171	0.0338	0.1618	0.2530	-0.0078	-0.1640	-0.2236	-0.2047	0.0
TCH--SEX	-0.1245	0.1252	0.2470	-0.2265	0.3175	0.1051	-0.3065	-0.0343	-0.1599	0.0
TCH--AGE	-0.1867	0.3302	0.3525	-0.1088	0.0149	0.1778	0.0352	0.2404	0.2213	0.0
T-YRSSCH	-0.0230	-0.0707	0.0973	-0.3255	-0.0653	0.0608	-0.0372	-0.0780	-0.0202	0.0
T-YRSTCH	-0.1561	0.3218	0.2682	-0.0460	0.2184	0.0783	0.0363	-0.0066	0.0441	0.0
T-ED.LEV	0.0046	-0.0211	-0.0477	0.1495	-0.1374	-0.1889	-0.0402	-0.1904	-0.1928	0.0
EX-T & A	-0.1034	0.2534	0.2458	-0.2660	-0.2199	0.2430	0.1904	0.5054	0.4983	0.0
DIS.FUND	-0.0886	0.1393	0.1206	0.1652	-0.1959	-0.1394	0.1621	0.1027	0.1116	0.0
PRIN-CHG	-0.0826	-0.1306	-0.0197	-0.2069	-0.4493	-0.2069	-0.0286	0.1701	0.0302	0.0

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Final Structural Analysis
Grade 2 Math (continued)

CORRELATIONS

	S COGSTY	S-ATT.-F	S-ATT.-S	S-EXP.-F	S-EXP.-S	CAT MCMP	CAT MCOM	MATH APL	MATH TOT	BLANK
INS.COMP	0.0707	-0.0735	-0.1167	-0.0704	-0.2571	-0.0869	0.2998	0.1775	0.2988	0.0
TEAMING	0.0656	0.0660	0.0670	0.0185	0.0387	-0.1821	0.1750	-0.1551	-0.0309	0.0
CONSCIOUS	0.0618	0.0513	0.0474	0.2683	0.3635	0.2341	-0.0422	-0.1219	-0.0297	0.0
CENTRALD	0.0996	0.0730	-0.0517	0.2556	0.3240	0.1523	-0.3040	-0.0871	-0.1844	0.0
PRINHELP	0.1094	-0.0788	-0.0052	0.0102	0.1171	-0.0722	0.1562	-0.0506	0.0725	0.0
S. STYLE	-0.1339	-0.0416	-0.0468	-0.4598	-0.4242	0.0827	-0.0116	0.2977	0.2276	0.0
P. STYLE	-0.1771	-0.0268	-0.0625	-0.3259	-0.3776	0.1852	0.1663	0.1092	0.2954	0.0
PSTYLE-T	-0.1480	0.2194	0.1841	0.0021	0.1344	0.0856	-0.0979	0.1119	0.0006	0.0
CLASS CL	0.1440	-0.1215	-0.2382	0.1922	-0.0639	-0.1042	-0.0924	-0.0543	-0.1499	0.0
ASPIRAT.	0.0624	0.2637	0.0657	0.1342	0.0139	-0.0774	0.0267	0.0377	-0.0309	0.0
SATISFCT	0.1365	-0.0045	-0.0147	0.0974	0.0995	0.1764	-0.1710	0.1326	-0.0322	0.0
T.P.STUD	0.3535	-0.2672	-0.4459	0.1848	0.3102	0.1221	-0.2199	-0.1972	-0.1922	0.0
TEACH.KN	0.1180	0.1006	0.1303	0.0463	0.0147	-0.1058	0.3229	-0.1071	0.1219	0.0
SUBJECTK	0.1728	-0.2404	-0.2763	0.3599	-0.0715	-0.2189	0.1905	0.0753	0.0983	0.0
VERB.FL.	0.5943	-0.0162	-0.2825	0.2819	0.2251	-0.3298	0.0711	-0.1491	-0.0355	0.0
MEMORY	0.0853	0.0877	-0.0704	0.0714	-0.1126	-0.0191	0.0452	0.0162	0.0243	0.0
REASONNG	0.2978	-0.1557	-0.3440	0.3020	0.0205	-0.2346	0.2030	-0.1643	-0.0261	0.0
FLEXIBLE	0.1952	-0.1228	-0.2273	0.1427	-0.0497	-0.1088	0.1408	-0.2078	-0.0359	0.0
T COGSTY	0.3305	-0.1793	-0.2952	0.2427	-0.0242	-0.0464	0.2552	-0.2609	0.0097	0.0
SFTAA	0.5026	-0.2627	-0.5223	0.3967	0.3614	-0.0479	-0.1175	-0.2198	-0.2057	0.0
S COGSTY	1.0000	-0.2010	-0.3698	0.5269	0.2747	0.1591	0.1777	-0.0352	0.1489	0.0
S-ATT.-F	-0.2010	1.0000	0.7089	-0.1671	0.0606	0.2224	0.3835	0.1951	0.4029	0.0
S-ATT.-S	-0.3698	0.7089	1.0000	-0.3787	-0.0946	0.1560	0.3279	0.3023	0.4141	0.0
S-EXP.-F	0.5269	-0.1671	-0.3787	1.0000	0.5344	0.0012	-0.0393	-0.1673	-0.1482	0.0
S-EXP.-S	0.2747	0.0606	-0.0946	0.5344	1.0000	0.1032	-0.0930	-0.3442	-0.2594	0.0
CAT MCMP	0.1591	0.2224	0.1560	0.0012	0.1032	1.0000	-0.1792	0.4201	0.4387	0.0
CAT MCOM	0.1777	0.3835	0.3279	-0.0393	-0.0930	-0.1792	1.0000	0.1151	0.6446	0.0
MATH APL	-0.0352	0.1951	0.3023	-0.1673	-0.3442	0.4201	0.1151	1.0000	0.7720	0.0
MATH TOT	0.1489	0.4029	0.4141	-0.1482	-0.2594	0.4387	0.6446	0.7720	1.0000	0.0
BLANK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0000
PSEUDO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Final Structural Analysis
Grade 5 Math

CORRELATIONS

	WD-----1	WD-----2	WD-----3	WD-----4	WD-----5	RAMOS--1	RAMOS--2	RAMOS--3	RAMOS--4	APPLE--1
WD-----1	1.0000	0.2746	0.3248	0.3921	0.1590	0.0351	-0.1293	-0.0323	-0.0845	0.1299
WD-----2	0.2746	1.0000	0.2762	0.5751	0.0503	0.0296	0.2301	-0.0480	0.1483	0.2343
WD-----3	0.3248	0.2762	1.0000	0.1312	0.1263	0.0026	-0.0149	0.0328	0.1383	-0.0937
WD-----4	0.3921	0.5751	0.1312	1.0000	0.1564	-0.0333	0.0004	-0.1534	-0.1580	-0.0281
WD-----5	0.1590	0.0503	0.1263	0.1564	1.0000	-0.0999	-0.2270	-0.1570	-0.0587	0.1145
RAMOS--1	0.0351	0.0296	0.0026	-0.0333	-0.0999	1.0000	0.7110	0.6890	0.5494	0.2026
RAMOS--2	-0.1293	0.2301	-0.0149	0.0004	-0.2270	0.7110	1.0000	0.6887	0.7115	0.0216
RAMOS--3	-0.0323	-0.0480	0.0328	-0.1534	-0.1570	0.6890	0.6887	1.0000	0.6971	0.2074
RAMOS--4	-0.0845	0.1483	0.1383	-0.1580	-0.0587	0.5494	0.7115	0.6971	1.0000	0.1169
APPLE--1	0.1299	0.2343	-0.0937	-0.0281	0.1145	0.2026	0.0216	0.2074	0.1169	1.0000
APPLE--2	-0.1724	-0.1122	-0.0891	-0.1895	-0.0248	0.1543	0.2036	0.2656	0.0474	-0.2063
APPLE--3	-0.0775	-0.0461	0.1014	-0.0546	-0.1620	0.0618	0.0816	0.2320	0.2734	0.1109
APPLE--5	0.0433	-0.1768	-0.2279	-0.0375	-0.0880	0.0424	0.1504	0.1563	-0.0558	-0.1512
APPLE--6	0.1160	-0.0833	-0.0553	-0.1210	-0.1153	0.0591	0.0430	0.1709	0.1900	0.1659
APPLE--7	-0.2530	-0.0048	0.1495	-0.1030	0.0944	0.0119	-0.0121	0.0618	0.1847	0.0944
APPLE--8	0.0202	0.0434	0.1417	-0.0392	0.0247	-0.0059	-0.0233	0.0745	0.0791	0.1409
APPLE--9	-0.0956	-0.1478	-0.1356	-0.1493	-0.1558	-0.2151	-0.1410	-0.1472	-0.2071	0.1851
APPLE-10	-0.0005	-0.2464	-0.0719	-0.2279	-0.2094	0.1613	0.2106	0.3354	0.3635	0.0102
APPLE-11	-0.1554	0.1745	-0.1398	0.0221	0.0070	0.2874	0.3768	0.1767	0.1941	0.1162
APPLE-12	-0.1973	0.1971	-0.0147	-0.0457	-0.0262	0.0095	0.1363	0.0335	0.2801	0.3467
APPLE-13	-0.0615	-0.1022	-0.0077	-0.1806	0.0549	0.3251	0.2057	0.4008	0.3474	0.1133
APPLE-14	0.0550	0.1442	-0.1098	-0.1416	-0.1717	-0.0084	0.1650	0.2866	0.2427	0.3103
TCH--SEX	0.2238	0.0650	0.1962	0.0986	0.0505	0.0071	0.0146	0.0948	0.0396	-0.0425
TCH--AGE	0.2498	0.2041	0.0073	0.1086	0.0715	0.2645	0.3115	0.3202	0.4133	-0.0102
T-Y-SSCH	-0.1437	0.0501	-0.1119	-0.0298	0.3453	0.0835	0.1432	0.1047	0.2291	0.1954
T-Y-STCH	0.1676	0.2097	0.0248	0.2123	0.0979	0.2275	0.2338	0.1639	0.0847	-0.0551
T-ED.LEV	0.0573	-0.1345	-0.2011	0.0493	0.3547	0.1779	-0.0837	-0.0160	0.0929	0.0492
EX-T & A	-0.1347	0.0771	0.0408	0.2413	0.0000	-0.0674	0.0368	-0.0376	-0.0614	-0.1770
DIS.FUND	0.0353	-0.0664	0.0049	-0.0473	0.0461	0.1766	0.2248	0.4259	0.2071	0.1958
PRIN-CHG	0.0417	0.1383	-0.0810	0.1701	0.0075	0.1788	0.0039	0.1270	0.0526	0.2865

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Final Structural Analysis
Grade 5 Math (continued)

CORRELATIONS

	WD-----1	WD-----2	WD-----3	WD-----4	WD-----5	RAMOS--1	RAMOS--2	RAMOS--3	RAMOS--4	APPLE--1
IND.COMP	0.3867	0.2042	-0.1460	0.2504	0.2639	-0.0453	-0.1618	-0.0980	-0.2160	0.2283
TEAMING	-0.0537	0.1032	0.0702	0.1163	0.0966	-0.1196	-0.1455	-0.0395	-0.1649	-0.1130
COMPETUS	-0.0045	0.1781	0.1127	-0.0028	-0.1160	0.0697	0.0970	0.1741	0.1330	0.1707
CENTRALD	0.0901	-0.2034	0.0001	-0.1619	0.1976	0.0170	-0.0596	0.2738	0.1899	0.0037
PARTICIP	0.1330	0.0663	-0.0724	0.1684	-0.1462	0.0011	-0.0062	-0.1882	-0.1572	-0.1320
AV.STYLE	-0.0885	0.1634	-0.2140	0.0097	0.1453	0.1703	-0.0903	-0.0387	-0.1752	0.2602
P.STYLE	0.0357	-0.0522	-0.2089	-0.1043	0.3306	0.1810	0.0993	0.0568	0.0905	0.0643
P.TYPE--T	0.0974	0.1272	0.2422	0.1368	0.1972	0.2166	0.1893	0.2914	0.2527	-0.2122
CLASS CL	0.2538	-0.2877	-0.0164	-0.1141	0.1829	0.0576	-0.1029	0.0741	0.1181	0.1393
ASPIRAT.	0.2515	-0.0089	-0.0454	0.1086	0.0944	-0.0463	-0.2827	-0.1338	-0.1487	0.1498
SATISFCT	0.1191	0.0268	0.0301	0.0825	0.2080	0.1275	-0.0639	0.2697	0.1669	0.1508
T.P.ATTUD	-0.0166	0.0224	-0.0278	-0.0076	0.2051	0.1417	0.0210	0.0193	-0.0083	0.1096
T.CHARM	-0.0786	0.0404	0.2278	0.1740	0.0391	-0.1409	-0.0542	-0.1103	-0.0874	-0.1255
SOLICIT	0.1448	0.0504	0.1794	-0.0757	-0.1640	0.1374	0.0339	-0.0448	0.1201	0.1583
VERB.FL.	0.0764	0.2536	0.1668	0.3030	-0.1340	0.1169	0.1022	-0.0345	0.0817	-0.0621
MEMORY	0.0561	0.0615	-0.0373	0.0837	-0.0063	-0.1462	-0.1229	-0.1711	-0.2866	0.1512
REASONNG	-0.0918	-0.0091	-0.0899	0.1840	0.0053	-0.0634	-0.1436	-0.2521	-0.1633	-0.0095
FLEXIBLE	0.0377	0.1434	0.0421	0.2569	0.0225	-0.0407	-0.0646	-0.1578	-0.0383	-0.0596
I COGSTY	-0.0839	0.1024	0.1458	0.0537	-0.0263	0.0337	0.0791	-0.1072	0.1008	-0.0809
SPTA.	-0.0483	0.0665	-0.1819	-0.0877	0.2326	0.1751	0.1019	0.2099	0.0505	0.1718
S COGSTY	-0.1570	0.0832	-0.2008	-0.0914	0.1067	0.0740	0.1432	0.1246	0.0395	-0.0404
S-ATT.-F	0.1065	0.1446	0.1048	0.0009	0.1153	0.1617	-0.0077	0.0398	0.0289	0.0641
S-ATT.-S	0.1490	0.0901	0.1745	0.0926	0.0255	0.1767	0.0701	0.1195	-0.0589	0.0573
S-EXP.-F	0.0743	-0.0505	0.0412	-0.0864	0.2010	-0.0926	-0.1260	-0.0235	-0.1241	-0.1119
S-EXP.-S	0.0141	0.0161	-0.0767	-0.0530	0.2007	0.0396	0.0757	0.0782	0.1186	0.0177
CAT MCMP	-0.1533	-0.0515	-0.2726	0.0785	-0.0230	-0.0297	0.0032	0.0017	0.0587	-0.1965
CAT MCOM	-0.0762	-0.0022	0.0358	0.1637	0.0191	0.0011	-0.0372	-0.1953	-0.1881	-0.0504
MATH APL	0.0409	0.1862	0.0811	0.2410	-0.1706	0.1277	0.2152	0.0382	0.1069	0.0243
MATH TOT	-0.0317	0.1262	-0.0198	0.2250	-0.1187	0.0835	0.1275	-0.0[illegible]	0.0470	-0.0370
BLANK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PSEUDO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Final Structural Analysis
Grade 5 Math (continued)

CORRELATIONS

	APPLE--2	APPLE--3	APPLE--5	APPLE--6	APPLE--7	APPLE--8	APPLE--9	APPLE-10	APPLE-11	APPLE-12
WD-----1	-0.1724	-0.0775	0.0433	0.1160	-0.2530	0.0202	-0.0956	-0.0005	-0.1554	-0.1973
WD-----2	-0.1122	-0.0461	-0.1768	-0.0833	-0.0048	0.0434	-0.1478	-0.2464	0.1745	0.1971
WD-----3	-0.0891	0.1014	-0.2279	-0.0553	0.1495	0.1417	-0.1356	-0.0719	-0.1398	-0.0147
WD-----4	-0.1895	-0.0546	-0.0375	-0.1210	-0.1030	-0.0392	-0.1493	-0.2279	0.0221	-0.0457
WD-----5	-0.0248	-0.1620	-0.0880	-0.1155	0.0944	0.0247	-0.1558	-0.2094	0.0070	-0.0262
RANDS--1	0.1543	0.0618	0.0424	0.0591	0.0119	-0.0059	-0.2151	0.1613	0.2874	0.0095
RANDS--2	0.2036	0.0816	0.1504	0.0430	-0.0121	-0.0233	-0.1410	0.2106	0.3768	0.1363
RANDS--3	0.2656	0.2320	0.1563	0.1709	0.0618	0.0745	-0.1472	0.3354	0.1767	0.0335
RANDS--4	0.0474	0.2734	-0.0558	0.1900	0.1847	0.0791	-0.2071	0.3635	0.1941	0.2801
APPLE--1	-0.2063	0.1109	-0.1512	0.1659	0.0944	0.1409	0.1861	0.0182	0.1163	0.3467
APPLE--2	1.0000	-0.2638	0.5577	-0.2004	-0.0459	-0.0342	-0.0758	0.0057	0.1346	0.0985
APPLE--3	-0.2638	1.0000	-0.1300	0.3797	0.3289	0.4503	0.1023	0.2726	0.0708	0.1715
APPLE--5	0.5577	-0.1300	1.0000	-0.1087	-0.2387	0.2212	0.0187	0.0050	0.1034	-0.0824
APPLE--6	-0.2004	0.3797	-0.1087	1.0000	-0.2938	0.1852	-0.1488	0.3456	-0.1924	0.1177
APPLE--7	-0.0459	0.3289	-0.2387	-0.2938	1.0000	0.0601	0.2125	0.0592	0.1618	0.3572
APPLE--8	-0.0342	0.4503	0.2212	0.1852	0.0601	1.0000	0.1305	-0.0429	-0.0747	0.0711
APPLE--9	-0.0758	0.1023	0.0187	-0.1488	0.2125	0.1305	1.0000	0.0088	0.0050	0.3663
APPLE-10	0.0057	0.2726	0.0050	0.3456	0.0592	-0.0429	0.0088	1.0000	-0.0995	-0.0089
APPLE-11	0.1346	0.0708	0.1034	-0.1924	0.1618	-0.0747	0.0050	-0.0995	1.0000	0.2450
APPLE-12	0.0985	0.1715	-0.0824	0.1177	0.3572	0.0711	0.3663	-0.0089	0.2450	1.0000
APPLE-13	0.0909	0.0749	-0.0155	0.0432	0.0434	0.0896	-0.1364	-0.0520	0.2412	-0.0030
APPLE-14	0.1203	0.2964	0.1242	0.2992	0.0914	0.2058	0.3673	0.4661	0.0856	0.2395
TCH--SEX	0.0787	0.0843	0.2258	-0.0222	0.0032	0.0665	-0.2223	0.0044	-0.1226	-0.0492
TCH--AGE	-0.0801	0.1150	-0.1272	0.2192	-0.0139	0.0280	0.0455	0.0524	0.0459	0.1229
T-YRSSCH	0.0898	-0.1009	-0.0898	-0.0080	0.1676	0.0001	0.1408	-0.0627	0.2388	0.2602
T-YRSTCH	0.0102	0.0271	-0.1564	0.0808	-0.0213	0.0121	0.1013	-0.2393	0.1422	0.0460
T-ED.LEV	-0.0173	-0.2010	-0.2493	-0.1160	0.2123	-0.2010	-0.0297	0.0068	0.1344	0.2273
EX-T & A	0.1772	-0.0448	0.0543	-0.2951	0.2269	-0.0462	0.1449	-0.0900	0.0278	0.0221
DIS.FUND	0.0167	0.0973	0.0397	-0.0912	0.0174	-0.1330	0.0513	0.0163	-0.0758	-0.0922
PRIN-CHG	0.0148	0.0382	0.0373	0.0836	0.0576	-0.1254	-0.2597	0.0709	0.0995	-0.0300

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Final Structural Analysis
Grade 5 Math (continued)

CORRELATIONS

	APPLE--2	APPLE--3	APPLE--5	APPLE--6	APPLE--7	APPLE--8	APPLE--9	APPLE-10	APPLE-11	APPLE-12
INS.COMP	0.0114	-0.2361	0.2759	0.0867	-0.3319	0.0143	0.0128	-0.1447	0.0044	-0.0269
TEAMING	-0.0335	-0.1954	-0.1919	-0.3731	0.0196	-0.0754	-0.0187	-0.1691	-0.1344	-0.2061
CONFORMS	-0.0272	0.1132	-0.1308	0.0229	-0.0592	-0.0283	-0.1256	-0.1289	-0.0680	-0.0850
CENTRALD	-0.0445	0.2337	-0.0108	0.1092	0.2359	0.3543	0.1257	0.2365	0.0318	-0.0368
PRINHELP	-0.0131	-0.1018	-0.0514	-0.1324	0.0399	-0.3822	0.1065	-0.1886	0.0702	0.0653
S. STYLE	0.0106	-0.0602	-0.0759	-0.0665	0.0717	-0.0499	-0.0025	-0.2170	0.0766	0.0567
P. STYLE	0.0748	-0.0592	0.0111	-0.1113	0.1629	-0.0776	0.0326	-0.0918	0.2132	0.0236
PSTYLE-T	0.0165	0.0527	-0.0623	-0.0561	-0.0187	0.2179	-0.1356	0.1706	0.0797	-0.0579
CLASS CL	-0.2247	0.1647	0.0633	0.1363	-0.0570	0.3450	0.0708	0.1055	-0.1366	0.1293
ASPIRAT.	-0.2257	0.0037	-0.0779	-0.0407	0.2062	0.1064	0.2031	0.0425	-0.2360	-0.0002
SATISFCT	-0.1088	0.0650	-0.1323	-0.0468	0.0927	0.2718	0.1345	0.0576	0.0219	0.0309
T.P.STUD	-0.1653	-0.0467	-0.0403	-0.0020	-0.0458	0.1761	0.2002	0.0366	-0.2810	-0.0168
TEACH.KN	0.0444	0.0926	-0.0050	-0.0900	0.0325	-0.1342	0.0783	-0.1612	0.0305	0.1111
SUBJECTK	-0.2021	0.0070	-0.1348	0.2738	-0.1066	-0.0280	0.2151	-0.0043	0.1171	0.2291
VERB.FL.	-0.1373	0.0953	-0.1397	0.1166	0.0643	-0.1613	-0.0455	0.0313	0.1679	0.1717
MEMORY	0.1584	-0.1360	0.2576	0.0054	0.0557	-0.2770	0.1618	0.0848	-0.0671	0.1667
REASONNG	-0.0441	-0.0514	-0.0147	-0.0202	-0.0794	-0.3011	0.0259	-0.1189	0.1909	0.0776
FLEXIBLE	-0.0848	-0.0725	-0.0491	0.0097	-0.0042	-0.3653	-0.0997	-0.0843	0.0753	0.0815
T COGSTY	0.0063	-0.1056	-0.0145	-0.0107	-0.0148	-0.3847	0.0290	0.1772	0.0118	0.1254
SPTAA	0.2160	-0.0257	0.0437	0.0776	-0.0815	0.1273	0.2720	0.0290	0.0478	0.1841
S COGSTY	0.2378	0.0458	0.0062	0.1711	-0.0629	-0.0126	0.2264	0.1356	-0.0972	0.1399
S-ATT.-F	0.2606	-0.1489	0.1132	-0.3265	0.0439	0.1408	0.0336	-0.2190	0.0332	0.0585
S-ATT.-S	0.1066	-0.0268	0.0733	-0.2744	0.2184	0.0386	0.0239	-0.1111	0.0273	0.0399
S-EXP.-F	0.1893	-0.0230	-0.0257	0.0252	-0.0832	-0.1958	-0.0471	-0.0178	0.0754	-0.0113
S-EXP.-S	0.1036	0.0959	-0.0457	0.3053	-0.0014	0.0747	-0.0951	0.0425	-0.0893	0.2806
CAT MCMP	-0.1810	0.1323	-0.2277	0.0430	0.1205	-0.0445	0.0329	0.0174	0.0322	0.0935
CAT MCOM	-0.4161	-0.1363	-0.1795	0.0444	0.0140	-0.0496	-0.1485	-0.0608	0.1378	-0.1908
MATH APL	-0.4879	0.2566	-0.2786	0.2057	0.1890	0.0209	0.0443	0.2223	0.1060	-0.0320
MATH TOT	-0.5231	0.1841	-0.3090	0.1555	0.1828	0.0344	-0.0423	0.1006	0.1334	-0.0526
BLANK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PSEUDO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Final Structural Analysis
Grade 5 Math (continued)

CORRELATIONS

	APPLE-13	APPLE-14	TCH--SEX	TCH--AGE	T-YRSSCH	T-YRSTCH	T-ED.LEV	EX-T & A	DIS.FUND	PRIN-CHG
WD-----1	-0.0615	0.0550	0.2238	0.2498	-0.1437	0.1676	0.0573	-0.1347	0.0353	0.0417
WD-----2	-0.1022	0.1442	0.0650	0.2041	0.0501	0.2097	-0.1345	0.0771	-0.0664	0.1383
WD-----3	-0.0077	-0.1098	0.1982	0.0073	-0.1119	0.0248	-0.2011	0.0408	0.0049	-0.0810
WD-----4	-0.1806	-0.1416	0.0986	0.1086	-0.0298	0.2123	0.0493	0.2413	-0.0473	0.1701
WD-----5	0.0549	-0.1717	0.0505	0.0715	0.3453	0.0979	0.3547	0.0000	0.0461	0.0075
RAMOS--1	0.3251	-0.0084	0.0071	0.2645	0.0835	0.2275	0.1779	-0.0674	0.1766	0.1788
RAMOS--2	0.2057	0.1650	0.0146	0.3115	0.1432	0.2338	-0.0837	0.0368	0.2248	0.0039
RAMOS--3	0.4008	0.2866	0.0948	0.3202	0.1047	0.1839	-0.0160	-0.0376	0.4259	0.1270
RAMOS--4	0.3474	0.2427	0.0396	0.4133	0.2291	0.0847	0.0929	-0.0614	0.2071	0.0526
APPLE--1	0.1130	0.3100	-0.0425	-0.0102	0.1954	-0.0551	0.0442	-0.1770	0.1958	0.2885
APPLE--2	0.0909	0.1203	0.0787	-0.0801	0.0898	0.0102	-0.0173	0.1772	0.0167	0.0148
APPLE--3	0.0749	0.2964	0.0843	0.1150	-0.1009	0.0271	-0.2010	-0.0448	0.0473	0.0382
APPLE--5	-0.0155	0.1242	0.2258	-0.1272	-0.0898	-0.1564	-0.2493	0.0543	0.0397	0.0373
APPLE--6	0.0432	0.2992	-0.0222	0.2192	-0.0080	0.0808	-0.1160	-0.2951	-0.0912	0.0836
APPLE--7	0.0434	0.0914	0.0032	-0.0139	0.1676	-0.0213	0.2123	0.2269	0.0174	0.0576
APPLE--8	0.0896	0.2058	0.0665	0.0280	0.0001	0.0121	-0.2010	-0.0462	-0.1330	-0.1254
APPLE--9	-0.1364	0.3673	-0.2223	0.0455	0.1408	0.1013	-0.0297	0.1449	0.0513	-0.2597
APPLE-10	-0.0520	0.4661	0.0044	0.0524	-0.0627	-0.2393	0.0068	-0.0900	0.0163	0.0709
APPLE-11	0.2412	0.0836	-0.1226	0.0459	0.2388	0.1422	0.1344	0.0278	-0.0758	0.0995
APPLE-12	-0.0030	0.2395	-0.0492	0.1229	0.2802	0.0460	0.2273	0.0221	-0.0922	-0.0300
APPLE-13	1.0000	0.0286	-0.0687	0.1168	0.0334	0.0634	0.0906	-0.3614	0.1020	-0.1804
APPLE-14	0.0286	1.0000	-0.2150	0.1798	-0.0373	0.0430	-0.1557	-0.0902	0.0726	0.0939
TCH--SEX	-0.0687	-0.2150	1.0000	-0.0703	0.0095	-0.1451	-0.1353	-0.2034	0.1185	0.0046
TCH--AGE	0.1168	0.1798	-0.0703	1.0000	0.4081	0.7672	0.3506	-0.0746	-0.0373	-0.2554
T-YRSSCH	0.0334	-0.0373	0.0095	0.4081	1.0000	0.4093	0.3523	0.0720	-0.0080	-0.1186
T-YRSTCH	0.0634	0.0430	-0.1451	0.7672	0.4093	1.0000	0.1956	0.0518	-0.0613	-0.2350
T-ED.LEV	0.0906	-0.1557	-0.1353	0.3506	0.3523	0.1956	1.0000	0.0315	-0.1407	0.0596
EX-T & A	-0.3614	-0.0902	-0.2034	-0.0746	0.0720	0.0518	0.0315	1.0000	-0.0522	-0.0201
DIS.FUND	0.1020	0.0726	0.1185	-0.0373	-0.0080	-0.0613	-0.1407	-0.0522	1.0000	0.2470
PRIN-CHG	-0.1804	0.0939	0.0046	-0.2554	-0.1186	-0.2350	0.0596	-0.0201	0.2470	1.0000

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Final Structural Analysis
Grade 5 Math (continued)

CORRELATIONS

	APPLE-13	APPLE-14	TCH--SEX	TCH--AGE	T-YRSSCH	T-YRSTCH	T-ED.LEV	EX-T & A	DIS.FUND	PRIN-CHG
INS.COMP	-0.0417	0.0322	0.0606	-0.0119	-0.1184	0.0279	0.0416	0.1344	-0.1446	0.0469
TEAMING	-0.1498	-0.2189	0.2208	-0.0859	-0.0023	-0.1063	0.0968	0.3280	0.2304	0.0692
CONSENUS	0.0990	-0.0908	0.4096	0.0369	-0.0533	0.0412	-0.1461	-0.0121	0.1960	-0.0703
CENTRALD	0.1972	0.2017	0.1872	0.3501	0.1874	0.1586	0.2536	-0.1748	0.1766	-0.0762
PAINHELP	-0.0016	-0.1477	-0.2562	0.0370	-0.2704	0.1475	-0.0793	-0.0297	-0.1567	0.0523
S. STYLE	0.0297	0.0297	-0.2127	-0.0834	0.1681	0.0742	0.2054	0.1986	-0.1270	0.0973
P. STYLE	0.1617	-0.0073	-0.0343	0.0589	0.2549	0.1669	0.1498	-0.0841	-0.0768	0.0177
PSTYLE-T	0.1131	-0.0587	0.2104	0.3308	0.4164	0.2404	0.2192	-0.0035	0.0860	-0.1787
CLASS CL	0.1521	-0.0763	0.1519	0.0587	-0.0224	-0.0906	0.3023	-0.3514	0.0640	-0.0641
ASPIRAT.	-0.0193	0.0712	-0.3147	-0.0061	-0.0778	-0.0020	0.1417	0.0716	0.1963	-0.0343
SATISFCT	0.1892	0.2484	0.1280	0.4156	0.3926	0.4249	0.4193	-0.0929	0.1085	-0.1001
T.P.STUD	0.2511	0.0522	-0.1654	0.2136	-0.0712	0.1223	0.1528	-0.1505	0.0291	-0.0863
TEACH.KN	0.0007	-0.1707	-0.0617	-0.1049	0.1770	-0.0687	-0.1587	0.1755	-0.0703	-0.1047
SUBJECTK	-0.0529	0.0527	-0.1497	-0.0657	-0.1268	-0.0931	0.0151	-0.2789	-0.1345	0.1140
VERB.FL.	0.0179	-0.0661	-0.1506	0.2167	0.2489	0.1793	0.0696	0.0293	-0.2924	0.0646
MEMORY	-0.1579	0.0713	-0.0336	-0.1976	0.0656	-0.2022	-0.1216	0.1658	-0.0060	0.2033
REASONNG	0.0655	-0.0999	-0.2933	-0.2426	0.0363	-0.1944	0.0634	0.0601	-0.1133	0.0500
FLEXIBLE	0.0648	-0.1931	-0.0011	-0.1139	0.1987	-0.1685	0.0091	0.0592	-0.0676	0.1965
T COGSTY	-0.0324	0.0187	-0.1808	-0.0626	0.0562	-0.0952	-0.1258	-0.0433	-0.1148	0.0289
SFTAA	0.0235	0.2060	-0.1296	0.1197	0.2893	0.1546	0.0967	-0.0116	-0.1165	0.0876
S COGSTY	-0.0043	0.2056	-0.1825	0.0331	0.1071	0.0652	-0.1034	-0.0225	-0.1014	0.1188
S-ATT.-F	0.0277	-0.1870	0.2103	0.0825	0.0006	-0.0191	0.2865	0.1378	0.0052	-0.0127
S-ATT.-S	-0.0475	-0.1461	0.2506	-0.1459	-0.1908	-0.1409	0.1621	0.1936	0.0388	0.1769
S-EXP.-F	-0.0947	-0.0680	-0.0034	-0.1536	-0.1038	-0.1056	0.0041	0.2138	-0.0047	0.1063
S-EXP.-S	0.0105	0.0531	-0.0545	-0.0351	-0.0851	-0.0702	0.1288	0.1494	-0.1392	0.2168
CAT MCMP	0.0485	-0.0770	-0.0566	0.0984	0.0178	0.1581	0.1109	0.2059	-0.2901	-0.1359
CAT MCOM	0.2482	-0.2865	-0.1083	-0.2106	-0.0312	-0.0716	-0.0443	-0.0371	-0.4001	-0.1309
MATH APL	0.0677	0.1058	-0.1211	-0.0499	-0.2695	-0.0116	-0.1339	-0.1381	-0.1090	0.0723
MATH TOT	0.1915	-0.0600	-0.1139	-0.0954	-0.2139	0.0037	-0.0953	-0.0499	-0.2839	-0.0219
BLANK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PSEUDO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Final Structural Analysis
Grade 5 Math (continued)

CORRELATIONS

	INS.COMP	TEAMING	CONCENUS	CENTRALD	PRINHELP	S. STYLE	P. STYLE	PSTYLE-T	CLASS CL	ASPIRAT.
WD-----1	0.3867	-0.0537	-0.0045	0.0901	0.1330	-0.0885	0.0057	0.0974	0.2538	0.2515
WD-----2	0.2042	0.1032	0.1781	-0.2034	0.0663	0.1634	-0.0522	0.1272	-0.2877	-0.0089
WD-----3	-0.1460	0.0702	0.1127	0.0601	-0.0724	-0.2140	-0.2089	0.2422	-0.0164	-0.0454
WD-----4	0.2504	0.1163	-0.0028	-0.1619	0.1684	0.0897	-0.1043	0.1368	-0.1141	0.1036
WD-----5	0.2639	0.0966	-0.1160	0.1976	-0.1462	0.1453	0.3306	0.1972	0.1829	0.0944
RAMOS--1	-0.0453	-0.1198	0.0897	0.0170	0.0011	0.1703	0.1810	0.2166	0.0576	-0.0483
RAMOS--2	-0.1618	-0.1455	0.0970	-0.0596	-0.0062	-0.0903	0.0993	0.1893	-0.1029	-0.2827
RAMOS--3	-0.0980	-0.0395	0.1741	0.2738	-0.1882	-0.0387	0.0568	0.2914	0.0741	-0.1338
RAMOS--4	-0.2160	-0.1649	0.1330	0.1899	-0.1572	-0.1752	0.0905	0.2527	0.1181	-0.1467
APPLE--1	0.2288	-0.1130	0.1709	0.0057	-0.1320	0.2662	0.0645	-0.2122	0.1393	0.1948
APPLE--2	0.0114	-0.0335	-0.0272	-0.0445	-0.0131	0.0106	0.0748	0.0165	-0.2247	-0.2257
APPLE--3	-0.2361	-0.1954	0.1132	0.2337	-0.1018	-0.0602	-0.0592	0.0527	0.1647	0.0037
APPLE--5	0.2759	-0.1919	-0.1308	-0.0108	-0.0514	-0.0759	0.0111	-0.0623	0.0633	-0.0779
APPLE--6	0.0867	-0.3731	0.0229	0.1092	-0.1324	-0.0665	-0.1113	-0.0561	0.1363	-0.0407
APPLE--7	-0.3319	0.0196	-0.0592	0.2359	0.0399	0.0717	0.1629	-0.0187	-0.0570	0.2062
APPLE--8	0.0143	-0.0754	-0.0283	0.3543	-0.3822	-0.0499	-0.0776	0.2179	0.3450	0.1064
APPLE--9	0.0128	-0.0187	-0.1256	0.1257	0.1065	-0.0025	0.0326	-0.1356	0.0708	0.2031
APPLE-10	-0.1447	-0.1691	-0.1289	0.2365	-0.1886	-0.2170	-0.0918	0.1706	0.1055	0.0425
APPLE-11	0.0044	-0.1344	-0.0660	0.0318	0.0762	0.0766	0.2132	0.0797	-0.1388	-0.2360
APPLE-12	-0.0269	-0.2061	-0.0850	-0.0368	0.0853	0.0567	0.0236	-0.0579	0.1293	-0.0002
APPLE-13	-0.0417	-0.1498	0.0990	0.1972	-0.0016	0.0297	0.1617	0.1131	0.1521	-0.0193
APPLE-14	0.0322	-0.2189	-0.0908	0.2017	-0.1477	0.0297	-0.0073	-0.0567	-0.0763	0.0712
TCH--SEX	0.0606	0.2208	0.4096	0.1872	-0.2562	-0.2127	-0.0343	0.2104	0.1519	-0.3147
TCH--AGE	-0.0119	-0.0859	0.0369	0.3501	0.0370	-0.0834	0.0589	0.3308	0.0587	-0.0061
T-YRSSCH	-0.1184	-0.0023	-0.0533	0.1874	-0.2704	0.1681	0.2549	0.4164	-0.0224	-0.0778
T-YRSTCH	0.0279	-0.1063	0.0412	0.1586	0.1475	0.0742	0.1669	0.2404	-0.0906	-0.0020
T-ED.LEV	0.0416	0.0968	-0.1461	0.2536	-0.0793	0.2054	0.1498	0.2192	0.3023	0.1417
EX-T & A	0.1344	0.3280	-0.0121	-0.1748	-0.0297	0.1986	-0.0841	-0.0035	-0.3514	0.0716
DIS.FUND	-0.1446	0.2304	0.1960	0.1786	-0.1587	-0.1270	-0.0768	0.0860	0.0640	0.1603
PRIN-CHG	0.0469	0.0692	-0.0703	-0.0762	0.0523	0.3973	0.0177	-0.1787	-0.0641	-0.0343

Final Structural Analysis
Grade 5 Math (continued)

CORRELATIONS

	INS.COMP	TEAMING	CONCENUS	CENTRALD	PRINHELP	S. STYLE	P. STYLE	PSTYLE-T	CLASS CL	ASPIRAT.
INS.COMP	1.0000	-0.0920	0.0508	0.0129	0.0391	0.0531	-0.0891	-0.1515	0.1561	0.1981
TEAMING	-0.0920	1.0000	0.1975	0.0886	-0.2542	0.0830	-0.0426	0.2841	-0.1763	-0.2036
CONCENUS	0.0508	0.1975	1.0000	0.0362	-0.1612	-0.2301	-0.1871	0.0305	0.0318	-0.2235
CENTRALD	0.0129	0.0886	0.0362	1.0000	-0.4428	-0.1675	0.0746	0.4497	0.4638	0.0899
PRINHELP	0.0391	-0.2542	-0.1612	-0.4428	1.0000	0.0812	0.0733	-0.4970	-0.2415	0.0126
S. STYLE	0.0531	0.0830	-0.2301	-0.1675	0.0812	1.0000	0.5418	-0.0527	-0.2229	-0.0034
P. STYLE	-0.0891	-0.0426	-0.1871	0.0746	0.0733	0.5418	1.0000	0.1727	0.0681	0.0692
PSTYLE-T	-0.1515	0.2841	0.0305	0.4497	-0.4970	-0.0527	0.1727	1.0000	0.2713	0.0168
CLASS CL	0.1561	-0.1763	0.0318	0.4638	-0.2415	-0.2229	0.0681	0.2713	1.0000	0.2509
ASPIRAT.	0.1981	-0.2036	-0.2235	0.0899	0.0126	-0.0034	0.0692	0.0168	0.2509	1.0000
SATISFCT	0.1353	0.1698	-0.0019	0.0265	-0.5099	0.0601	0.0518	0.6320	0.3974	0.2106
T.P.STUD	0.2503	0.0248	0.0159	0.1859	0.0466	0.2701	0.0897	0.0426	0.2225	0.1091
TEACH.KN	-0.1622	-0.0204	-0.0693	-0.3573	0.2745	0.1147	0.1153	-0.0591	-0.3463	-0.1684
SUBJECTK	0.1223	-0.3402	0.0400	-0.1043	0.1640	-0.1641	-0.0404	-0.0743	0.3023	0.1194
VERB.FL.	-0.0745	-0.2262	-0.0376	-0.3067	0.3891	0.1090	-0.0271	0.0700	-0.1683	-0.1349
MEMORY	0.2256	-0.1120	-0.0302	-0.2523	0.2310	0.1872	-0.0117	-0.1645	-0.1628	0.1569
REASONNG	0.1201	-0.1457	0.0035	-0.4373	0.3430	0.1176	0.0011	-0.3158	-0.2218	0.0679
FLEXIBLE	0.0364	-0.0270	-0.0175	-0.4085	0.3230	0.0933	-0.0699	-0.0461	-0.1870	-0.1570
T COGSTY	-0.0416	-0.2486	-0.0310	-0.4454	0.3949	-0.0076	-0.0581	-0.3024	-0.2955	-0.2133
SFTAA	0.2154	0.0000	-0.4049	0.0928	0.0857	0.4415	0.3066	0.1136	-0.0222	-0.0931
S COGSTY	0.1073	-0.0646	-0.2124	-0.1000	0.2147	0.3855	0.1442	-0.0738	-0.1987	-0.2449
S-ATT.-F	0.0928	0.2574	0.2006	0.1554	-0.0827	0.0486	0.0118	0.1129	0.1653	0.1106
S-ATT.-S	0.0769	0.1124	-0.0268	0.0223	0.1324	0.2810	0.0679	-0.0304	0.1111	0.0167
S-EXP.-F	0.2499	0.0959	-0.1444	-0.0617	0.0788	0.0226	-0.1351	-0.0093	-0.1396	-0.1325
S-EXP.-S	0.2588	-0.0851	-0.2005	-0.0800	0.1307	0.2030	-0.0885	-0.1135	0.0419	-0.1267
CAT MCMP	0.1620	0.1454	0.1649	0.0184	0.1414	0.0286	0.0906	0.0517	0.1199	-0.2048
CAT MCOM	0.1157	-0.1165	-0.1197	-0.1568	0.1332	0.1556	0.0108	-0.1718	-0.0871	-0.1347
MATH APL	0.0929	-0.2654	-0.0575	-0.0837	0.2387	-0.1372	-0.1142	-0.1252	0.0157	0.1618
MATH TOT	0.1779	-0.1890	-0.0143	-0.1051	0.2728	0.0030	-0.0420	-0.1318	0.0215	-0.0104
BLANK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PSEUDO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Final Structural Analysis
Grade 5 Math (continued)

CORRELATIONS

	SATISFCT	T.P.STUD	TEACH.KN	SUBJECTK	VERB.FL.	MEMORY	REASONNG	FLEXIBLE	T COGSTY	SFTAA
WD-----1	0.1191	-0.0166	-0.0786	0.1448	0.0764	0.0561	-0.0918	0.0377	-0.0839	-0.0483
WD-----2	0.0268	0.0224	0.0404	0.0504	0.2536	0.0615	-0.0091	0.1434	0.1024	0.0665
WD-----3	0.0301	-0.0278	0.2278	0.1794	0.1668	-0.0373	-0.0899	0.0421	0.1458	-0.1819
WD-----4	0.0825	-0.0076	0.1740	-0.0757	0.3030	0.0837	0.1840	0.2569	0.0557	-0.0077
WD-----5	0.2080	0.2051	0.0391	-0.1640	-0.1340	-0.0063	0.0053	0.0225	-0.0263	0.2366
RAMOS--1	0.1275	0.1417	-0.1409	0.1374	0.1169	-0.1462	-0.0634	-0.0407	0.0337	0.1751
RAMOS--2	-0.0639	0.0210	-0.0542	0.0339	0.1022	-0.1229	-0.1436	-0.0646	0.0791	0.1019
RAMOS--3	0.2697	0.0193	-0.1103	-0.0448	-0.0345	-0.1711	-0.2521	-0.1578	-0.1072	0.2059
RAMOS--4	0.1669	-0.0083	-0.0874	0.1201	0.0817	-0.2866	-0.1633	-0.0383	0.1008	0.0533
APPLE--1	0.1508	0.1096	-0.1255	0.1585	-0.0621	0.1512	-0.0095	-0.0596	-0.0809	0.1718
APPLE--2	-0.1088	-0.1653	0.0444	-0.2021	-0.1373	0.1584	-0.0441	-0.0848	0.0063	0.2160
APPLE--3	0.0650	-0.0467	0.0926	0.0070	0.0953	-0.1560	-0.0514	-0.0725	-0.1056	-0.0257
APPLE--5	-0.1323	-0.0403	-0.0050	-0.1348	-0.1397	0.2576	-0.0147	-0.0491	-0.0145	0.0437
APPLE--6	-0.0488	-0.0020	-0.0900	0.2738	0.1166	0.0054	-0.0202	0.0097	-0.0107	0.0776
APPLE--7	0.0927	-0.0458	0.0325	-0.1066	0.0643	0.0557	-0.0794	-0.0042	-0.0148	-0.0815
APPLE--8	0.2718	0.1761	-0.1342	-0.0280	-0.1813	-0.2770	-0.3011	-0.3653	-0.3847	0.1273
APPLE--9	0.1345	0.2002	0.0783	0.2151	-0.0455	0.1818	0.0259	-0.0997	0.0290	0.2720
APPLE-10	0.0576	0.0366	-0.1612	-0.0043	0.0313	0.0848	-0.1189	-0.0843	0.1772	0.0290
APPLE-11	0.0219	-0.2810	0.0305	0.1171	0.1679	-0.0671	0.1909	0.0753	0.0118	0.0478
APPLE-12	0.0309	-0.0168	0.1111	0.2291	0.1717	0.1667	0.0776	0.0815	0.1254	0.1641
APPLE-13	0.1892	0.2511	0.0007	-0.0529	0.0179	-0.1579	0.0655	0.0648	-0.0324	0.0235
APPLE-14	0.2484	0.0522	-0.1707	0.0527	-0.0661	0.0713	-0.0999	-0.1931	0.0187	0.2060
TCH--SEX	0.1280	-0.1654	-0.0617	-0.1497	-0.1506	-0.0336	-0.2933	-0.0011	-0.1808	-0.1296
TCH--AGE	0.4156	0.2136	-0.1049	-0.0657	0.2167	-0.1976	-0.2426	-0.1139	-0.0626	0.1197
T-YRSSCH	0.3926	-0.0712	0.1770	-0.1268	0.2489	0.0656	0.0363	0.1987	0.0562	0.2693
T-YRSTCH	0.4249	0.1223	-0.0687	-0.0931	0.1793	-0.2022	-0.1944	-0.1685	-0.0952	0.1546
T-ED.LEV	0.4193	0.1528	-0.1587	0.0151	0.0696	-0.1216	0.0634	0.0091	-0.1258	0.0967
EX-T & A	-0.0929	-0.1505	0.1755	-0.2789	0.0293	0.1658	0.0601	0.0592	-0.0433	-0.0116
DIS.FUND	0.1085	0.0291	-0.0703	-0.1345	-0.2924	-0.0060	-0.1133	-0.0676	-0.1148	-0.1165
PRIN-CHG	-0.1001	-0.0863	-0.1047	0.1140	0.0646	0.2033	0.0500	0.1965	0.0269	0.0876

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Final Structural Analysis
Grade 5 Matn (continued)

CORRELATIONS

	SATISFCT	T.P.STUD	TEACH.KN	SUBJECTK	VERB.FL.	MEMORY	REASONNG	FLEXIBLE	T COGSTY	SFTAA
INS.COMP	0.1353	0.2503	-0.1622	0.1223	-0.0745	0.2256	0.1201	0.0364	-0.0416	0.2154
TEAMING	0.1698	0.0248	-0.0204	-0.3402	-0.2262	-0.1120	-0.1457	-0.0270	-0.2486	0.0000
CONCENUS	-0.0019	0.0159	-0.0693	0.0400	-0.0376	-0.0302	0.0035	-0.0175	-0.0310	-0.4044
CENTRALD	0.6265	0.1859	-0.3573	-0.1043	-0.3067	-0.2523	-0.4373	-0.4085	-0.4454	0.0926
PRINHELP	-0.5099	0.0466	0.2745	0.1640	0.3891	0.2310	0.3430	0.3230	0.3549	0.0657
S. STYLE	0.0601	0.0701	0.1147	-0.1641	0.1090	0.1672	0.1176	0.0933	-0.0076	0.4415
P. STYLE	0.0518	0.0897	0.1153	-0.0404	-0.0271	-0.0117	0.0011	-0.0699	-0.0581	0.3065
PSTYLE-T	0.6320	0.0426	-0.0591	-0.0743	0.0700	-0.1645	-0.3158	-0.0461	-0.3024	0.1136
CLASS CL	0.3974	0.2225	-0.3463	0.3023	-0.1683	-0.1628	-0.2218	-0.1870	-0.2955	-0.0222
ASPIRAT.	0.2106	0.1691	-0.1684	0.1194	-0.1349	0.1509	0.0079	-0.1570	-0.2133	-0.0932
SATISFCT	1.0000	0.1718	-0.3982	-0.0903	-0.2368	-0.3271	-0.3611	-0.3516	-0.4441	0.2347
T.P.STUD	0.1718	1.0000	-0.0464	0.0661	0.0091	0.0967	0.0130	-0.1287	0.0656	0.1822
TEACH.KN	-0.3982	-0.0464	1.0000	0.0195	0.5942	0.2383	0.6088	0.6492	0.5535	0.0380
SUBJECTK	-0.0903	0.0661	0.0195	1.0000	0.2858	-0.0492	0.2074	0.1402	0.2024	0.0353
VERB.FL.	-0.2368	0.0091	0.5942	0.2858	1.0000	0.2534	0.5333	0.7342	0.6030	0.0014
MEMORY	-0.3271	0.0967	0.2383	-0.0492	0.2534	1.0000	0.3708	0.4378	0.3626	0.0138
REASONNG	-0.3611	0.0130	0.6088	0.2074	0.5333	0.3708	1.0000	0.6346	0.6337	-0.1257
FLEXIBLE	-0.3516	-0.1287	0.6492	0.1402	0.7342	0.4378	0.6346	1.0000	0.6582	-0.0255
T COGSTY	-0.4441	0.0656	0.5535	0.2024	0.6030	0.3626	0.6337	0.6582	1.0000	-0.0183
SFTAA	0.2347	0.1822	0.0380	0.0353	0.0014	0.0138	-0.1257	-0.0255	-0.0183	1.0000
S COGSTY	-0.1840	0.3032	0.2082	-0.0140	0.1822	0.1380	0.0357	0.2069	0.2983	0.7204
S-ATT.-F	0.2549	0.0291	-0.2618	-0.0183	-0.2650	0.0406	-0.1864	-0.2191	-0.2647	0.2025
S-ATT.-S	0.0556	0.1188	-0.0590	-0.0299	-0.1210	0.1727	-0.1224	-0.0316	-0.1758	0.2076
S-EXP.-F	-0.0982	-0.2194	-0.1217	-0.0641	-0.1938	0.0724	0.0072	-0.1101	-0.1310	0.2985
S-EXP.-S	-0.2388	0.1501	-0.1013	0.0017	-0.0170	0.0760	-0.1052	0.0304	-0.1062	0.3415
CAT MCMP	0.1033	0.1419	-0.0089	0.0375	0.2231	-0.1006	0.1043	0.1962	0.1362	0.0542
CAT MCOM	-0.1425	0.1236	0.1901	0.0111	0.3392	0.0838	0.2969	0.3516	0.2479	-0.0506
MATH APL	-0.0768	0.2870	-0.0641	0.4204	0.1884	-0.0789	0.0173	0.0464	0.1282	-0.1058
MATH TOT	-0.0499	0.3055	0.0121	0.2687	0.2908	-0.0882	0.1233	0.1959	0.1831	-0.0532
BLANK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PSEUDO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Final Structural Analysis
Grade 5 Math (continued)

CORRELATIONS

	S COGSTY	S-ATT.-F	S-ATT.-S	S-EXP.-F	S-EXP.-S	CAT MCMP	CAT MCOM	MATH APL	MATH TCT
WD-----1	-0.1570	0.1065	0.1490	0.0743	0.0141	-0.1533	-0.0762	0.0409	-0.0517
WD-----2	0.0832	0.1446	0.0901	-0.0505	0.0161	-0.0515	-0.0022	0.1862	0.1262
WD-----3	-0.2008	0.1048	0.1745	0.0412	-0.0767	-0.2726	0.0358	0.0811	-0.0198
WD-----4	-0.0914	0.0009	0.0926	-0.0864	-0.0530	0.0785	0.1637	0.2410	0.2250
WD-----5	0.1067	0.1153	0.0255	0.2010	0.2007	-0.0230	0.0191	-0.1706	-0.1187
RAMOS--1	0.0740	0.1617	0.1767	-0.0926	0.0396	-0.0297	0.0011	0.1277	0.0835
RAMOS--2	0.1432	-0.0077	0.0701	-0.1260	0.0757	0.0032	-0.0372	0.2152	0.1275
RAMOS--3	0.1246	0.0398	0.1195	-0.0235	0.0782	0.0017	-0.1953	0.0382	-0.0130
RAMOS--4	0.0395	0.0289	-0.0589	-0.1241	0.1186	0.0587	-0.1881	0.1069	0.0470
APPLE--1	-0.0404	0.0641	0.0573	-0.1119	0.0177	-0.1965	-0.0504	0.0243	-0.0370
APPLE--2	0.2378	0.2606	0.1066	0.1893	0.1036	-0.1810	-0.4161	-0.4879	-0.5231
APPLE--3	0.0458	-0.1489	-0.0268	-0.0230	0.0959	0.1323	-0.1363	0.2566	0.1841
APPLE--5	0.0062	0.1132	0.0733	-0.0257	-0.0457	-0.2277	-0.1795	-0.2786	-0.3090
APPLE--6	0.1711	-0.3265	-0.2744	0.0252	0.3053	0.0430	0.0444	0.2057	0.1555
APPLE--7	-0.0629	0.0439	0.2184	-0.0832	-0.0014	0.1205	0.0140	0.1890	0.1828
APPLE--8	-0.0126	0.1408	0.0386	-0.1958	0.0747	-0.0445	-0.0496	0.0209	0.0344
APPLE--9	0.2204	0.0336	0.0239	-0.0471	-0.0951	0.0329	-0.1485	0.0443	-0.0423
APPLE-10	0.1356	-0.2190	-0.1111	-0.0178	0.0425	0.0174	-0.0608	0.2223	0.1006
APPLE-11	-0.0972	0.0332	0.0273	0.0754	-0.0893	0.0322	0.1378	0.1060	0.1334
APPLE-12	0.1399	0.0585	0.0399	-0.0113	0.2806	0.0935	-0.1908	-0.0320	-0.0526
APPLE-13	-0.0043	0.0277	-0.0475	-0.0947	0.0105	0.0485	0.2482	0.0677	0.1915
APPLE-14	0.2656	-0.1870	-0.1461	-0.0680	0.0531	-0.0770	-0.2865	0.1058	-0.0600
TCH--SEX	-0.1825	0.2103	0.2506	-0.0034	-0.0545	-0.0566	-0.1083	-0.1211	-0.1139
TCH--AGE	0.0331	0.0825	-0.1459	-0.1536	-0.0351	0.0984	-0.2106	-0.0499	-0.0954
T-YRSSCH	0.1071	0.0006	-0.1908	-0.1038	-0.0851	0.0178	-0.0312	-0.2895	-0.2139
T-YRSTCH	0.0652	-0.0191	-0.1409	-0.1056	-0.0702	0.1581	-0.0716	-0.0116	0.0037
T-ED.LEV	-0.1034	0.2865	0.1621	0.0041	0.1288	0.1109	-0.0443	-0.1339	-0.0953
EX-T C A	-0.0225	0.1378	0.1936	0.2138	0.1494	0.2059	-0.0371	-0.1381	-0.0499
DIS.FUND	-0.1014	0.0052	0.0388	-0.0047	-0.1392	-0.2901	-0.4001	-0.1090	-0.2839
PRIN-CHG	0.1188	-0.0127	0.1769	0.1083	0.2188	-0.1351	-0.1309	0.0723	-0.0219

Final Structural Analysis
Grade 5 Math (continued)

CORRELATIONS

	S COGSTY	S-ATT.-F	S-ATT.-S	S-EXP.-F	S-EXP.-S	CAT MCMP	CAT MCOM	MATH APL	MATH TOT
INS.COMP	0.1073	0.0928	0.0769	0.2499	0.2588	0.1620	0.1157	0.0929	0.1779
TEAMING	-0.0646	0.2574	0.1124	0.0959	-0.0851	0.1454	-0.1165	-0.2654	-0.1890
CONCLNUS	-0.2124	0.2006	-0.0268	-0.1444	-0.2005	0.1649	-0.1197	-0.0575	-0.0143
CENTRALD	-0.1000	0.1554	0.0223	-0.0617	-0.0800	0.0184	-0.1568	-0.0837	-0.1051
PRIMHELP	0.2147	-0.0827	0.1324	0.0788	0.1307	0.1414	0.1332	0.2387	0.2728
S. STYLE	0.3855	0.0486	0.2610	0.0226	0.2030	0.0286	0.1556	-0.1372	0.0050
P. STYLE	0.1442	0.0118	0.0679	-0.1351	-0.0885	0.0906	0.0108	-0.1142	-0.0420
PSTYLE-T	-0.0738	0.1129	-0.0304	-0.0093	-0.1135	0.0517	-0.1718	-0.1252	-0.1318
CLASS CL	-0.1987	0.1653	0.1111	-0.1396	0.0419	0.1199	-0.0871	0.0157	0.0215
ASPIRAT.	-0.2449	0.1106	0.0167	-0.1325	-0.1267	-0.2048	-0.1347	0.1618	-0.0104
SATISFCT	-0.1040	0.2549	0.0556	-0.0982	-0.2388	0.1033	-0.1425	-0.0768	-0.0499
T.P.STUD	0.3032	0.0291	0.1188	-0.2194	0.1501	0.1419	0.1236	0.2870	0.30[illegible]
TEACH.KN	0.2082	-0.2618	-0.0590	-0.1217	-0.1013	-0.0089	0.1901	-0.0641	0.0121
SUBJECTK	-0.0140	-0.0183	-0.0299	-0.0641	0.0017	0.0375	0.0111	0.4204	0.2687
VERB.FL.	0.1822	-0.2650	-0.1210	-0.1938	-0.0170	0.2231	0.3392	0.1884	0.2408
MEMORY	0.1380	0.0406	0.1727	0.0724	0.0760	-0.1096	0.0838	-0.0789	-0.0882
REASONNG	0.0357	-0.1864	-0.1224	0.0072	-0.1052	0.1043	0.2969	0.0173	0.1233
FLEXIBLE	0.2069	-0.2191	-0.0316	-0.1101	0.0304	0.1962	0.3516	0.0464	0.1959
T COGSTY	0.2983	-0.2647	-0.1758	-0.1310	-0.1062	0.1362	0.2479	0.1282	0.1831
SFTAA	0.7204	0.2025	0.2076	0.2985	0.3415	0.0542	-0.0506	-0.1038	-0.0532
S COGSTY	1.0000	-0.1301	0.0416	0.2325	0.4897	0.2108	0.0387	0.0277	0.1036
S-ATT.-F	-0.1301	1.0000	0.6211	0.1889	-0.0140	-0.2113	-0.2647	-0.3831	-0.3756
S-ATT.-S	0.0416	0.6211	1.0000	0.1620	0.2390	-0.0402	0.0986	0.0171	0.0748
S-EXP.-F	0.2325	0.1889	0.1620	1.0000	0.5286	-0.0220	-0.2100	-0.1863	-0.2040
S-EXP.-S	0.4897	-0.0140	0.2390	0.5286	1.0000	0.2266	-0.0471	0.0022	0.0814
CAT MCMP	0.2108	-0.2113	-0.0402	-0.0220	0.2266	1.0000	0.2672	0.2064	0.5356
CAT MCOM	0.0387	-0.2647	0.0986	-0.2100	-0.0471	0.2672	1.0000	0.4020	0.7085
MATH APL	0.0277	-0.3831	0.0171	-0.1863	0.0022	0.2064	0.4020	1.0000	0.8607
MATH TOT	0.1036	-0.3756	0.0748	-0.2040	0.0814	0.5356	0.7085	0.8607	1.0000
BLANK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PSEUDO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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BEGINNING TEACHER EVALUATION STUDY: PHASE II

FINAL REPORT: VOLUME I, APPENDIX C

MULTIPLE REGRESSIONS OF OUTCOME MEASURES ON TEACHER PERFORMANCE FOR THE TOTAL GROUP

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BEGINNING TEACHER EVALUATION STUDY: FINAL REPORT

Volume I, Appendix C

MULTIPLE REGRESSIONS OF OUTCOME MEASURES ON TEACHER PERFORMANCE FOR THE TOTAL GROUP

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Multiple Regressions of Outcome Measures on Teaching Performances; Grade 2-Residual Scores

In this section we present the multiple regressions for all the variables first as a total group, then individually, then as groups by instrument. Total scores for reading and mathematics are used as the dependent measures. The results are presented first for second grade with both the results for reading and mathematics given for each kind of analysis by type of score.

Tables A.1 and A.2 present the multiple regression of residual scores (spring scores with fall scores partialled out) on the total group of performance measures. Although R is large for both reading and mathematics, it is non-significant.

We alert the reader to the fact that in the following section we will present stepwise regressions using these same variables. Those data will show that beyond a certain point, entering additional variables does not contribute to the relationship. Such being the case, the meaning of the results in Tables A.1 and A.2 is clearer. Since all the variables are in the analysis whose results are in Tables A.1 and A.2, some of these variables are "noise" and are effectively reducing the likelihood of obtaining a significant R when all the variables are used.

One-Step Regressions - Residual Scores

Tables A.3 and A.4 present the multiple regression analysis data when the performance variables are entered one at a time. For Reading, WD-4 related to complexity of instructional organization, and R-3

Table A.1

Regression of Spring Scores with Fall Scores as the Concomitant Variable Against Teaching Performance Variables; Grade 2 Reading (N = 40)*.

GRADE 2 READING E

THE DEPENDENT VARIABLE IS TOTREADS. THE MULTIPLE CORRELATION IS 0.7397. THE STANDARD ERROR OF ESTIMATE= 0.0626

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		39.			
UNDER NULL HYPOTHESIS	0.1383	1.0000	38.			
DUE TO HYPOTHESIS	0.0757	0.5472	22.	0.0034	0.8789	0.6177
ERROR	0.0626	0.4528	16.	0.0039		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 16.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOTREADF		0.9495	0.0969	9.8032		0.5828
INDEPENDENT VARIABLES						
WD-1	-0.0316	-0.0119	0.1284	-0.0925	-0.0002	0.7577
WD-2	0.0448	0.0168	0.1183	0.1423	-0.0006	0.7142
WD-3	-0.1212	-0.0452	0.0997	-0.4530	-0.0058	0.6048
WD-4	0.2513	-0.0938	0.1028	-0.9122	-0.0235	0.6285
WD-5	0.1003	0.0383	0.1389	0.2757	-0.0022	0.7861
RAMOS-1	-0.1049	-0.0396	0.1529	0.2592	-0.0019	0.8271
RAMOS-2	-0.2210	-0.0826	0.1522	-0.5428	-0.0083	0.8293
RAMOS-3	0.4327	0.1641	0.1316	1.2468	-0.0440	0.7650
RAMOS-4	-0.0403	-0.0151	0.1130	-0.1339	-0.0005	0.6373
APPLE-1	0.0153	0.0057	0.0974	0.0533	-0.0001	0.5865
APPLE-2	-0.2321	-0.0879	0.1266	-0.6943	-0.0136	0.7469
APPLE-3	-0.4658	-0.1747	0.1617	-1.0802	-0.0330	0.8465
APPLE-5	0.3099	0.1152	0.0890	1.2947	-0.0474	0.5059
APPLE-6	0.2578	0.0965	0.1128	0.8552	-0.0207	0.6887
APPLE-7	0.2829	0.1130	0.1635	0.6909	-0.0135	0.8312
APPLE-8	-0.0024	-0.0009	0.0865	-0.0102	-0.0000	0.4702
APPLE-9	0.2461	0.0916	0.1148	0.7978	-0.0180	0.7027
APPLE-10	-0.0653	-0.0243	0.1009	-0.2408	-0.0016	0.6154
APPLE-11	0.1474	0.0574	0.1034	0.5545	-0.0087	0.5995
APPLE-12	0.1915	0.0712	0.1226	0.5812	-0.0096	0.7393
APPLE-13	-0.1682	-0.0638	0.1447	-0.4406	-0.0055	0.8062
APPLE-14	-0.1000	-0.0373	0.0955	-0.3907	-0.0043	0.5676

*The reader will note that N=40 in the title and df=39 in the printout. A degree of freedom was lost because the correlation matrix was used as the input in this and the following analyses on the actual data runs.

Table A.2

Regression of Spring Scores with Fall Scores as the Concomitant Variable Against Teaching Performance Variables; Grade 2 Mathematics (N = 41).

GRADE 2 MATH

THE DEPENDENT VARIABLE IS TOTMATHS. THE MULTIPLE CORRELATION IS 0.6133. THE STANDARD ERROR OF ESTIMATE= 0.0733

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		40.			
UNDER NULL HYPOTHESIS	0.2700	1.0000	39.			
DUE TO HYPOTHESIS	0.1786	0.6615	22.	0.0081	1.5099	0.1948
ERROR	0.0914	0.3385	17.	0.0054		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 17.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOTMATHF		0.8601	0.1017	8.6541		0.4801
INDEPENDENT VARIABLES						
AD-1	0.1739	0.0920	0.1178	0.7811	-0.0121	0.5584
AD-2	0.6746	0.3517	0.1323	2.6589	-0.1408	0.6906
AD-3	0.2122	0.1102	0.0945	1.1669	-0.0271	0.3576
AD-4	-1.0185	-0.5519	0.1417	-3.7535	-0.2805	0.7295
AD-5	-0.2039	-0.1070	0.1024	-1.0452	-0.0218	0.4768
RANDS-1	0.4731	0.2548	0.1699	1.4997	-0.0446	0.7999
RANDS-2	0.2034	0.1108	0.1500	0.7375	-0.0108	0.7581
RANDS-3	-0.2967	-0.1579	0.1862	-0.6482	-0.0143	0.8394
RANDS-4	-0.6332	-0.3308	0.1559	-2.1219	-0.0897	0.7764
APPLE-1	-0.0746	-0.0388	0.1403	-0.2766	-0.0015	0.7266
APPLE-2	-0.3403	-0.1791	0.1314	-1.3630	-0.0370	0.6805
APPLE-3	0.4569	0.2439	0.1515	1.6098	-0.0516	0.7528
APPLE-5	-0.1458	-0.0778	0.1408	-0.5526	-0.0061	0.7138
APPLE-6	-0.8621	-0.4480	0.1877	-2.3867	-0.1134	0.8474
APPLE-7	-0.5690	-0.2960	0.1913	-1.5476	-0.0477	0.8527
APPLE-8	0.0417	0.0217	0.1000	0.2167	-0.0009	0.4619
APPLE-9	-0.6906	-0.3713	0.1703	-2.1797	-0.0946	0.8016
APPLE-10	-0.1599	-0.0832	0.1050	-0.8080	-0.0130	0.4918
APPLE-11	-0.4015	-0.2088	0.1122	-1.8609	-0.0690	0.5723
APPLE-12	-0.2220	-0.1154	0.1055	-1.0932	-0.0238	0.5170
APPLE-13	0.5209	0.2714	0.1290	2.1046	-0.0882	0.6749
APPLE-14	0.0593	0.0317	0.1075	0.2953	-0.0017	0.5069

Table A.3

Regression Parameters for Teaching Performance Variables; Grade 2 Reading Residual Scores

Performance Variable	|R|	$\sigma_{y \cdot x}$	df	p	Prop. of SQ.
WD - 1	.25	.06	39	.13	.06
WD - 2	.16	.06	39	.33	.03
WD - 3	.11	.06	39	.51	.01
WD - 4	.43(-.43)*	.05	39	.01	.18
WD - 5	.01	.06	39	.94	.00
RA - 1	.25	.06	39	.13	.06
RA - 2	.15	.06	39	.35	.02
RA - 3	.30	.06	39	.06	.09
RA - 4	.12	.06	39	.46	.01
AP - 1	.21	.06	39	.19	.05
AP - 2	.25	.06	39	.12	.06
AP - 3	.04	.06	39	.82	.00
AP - 5	.05	.06	39	.74	.00
AP - 6	.29	.05	39	.07	.09
AP - 7	.003	.06	39	.98	.00
AP - 8	.16	.06	39	.32	.03
AP - 9	.08	.06	39	.61	.01
AP - 10	.02	.06	39	.90	.00
AP - 11	.18	.06	39	.28	.03
AP - 12	.36	.06	39	.02	.13
AP - 13	.07	.06	39	.69	.00
AP - 14	.19	.06	39	.25	.03

*Note that the absolute value of R is given. If R is significant, and if r between the variable and Spring total score was negative, the value of that r is given in the parentheses.

Table A.4

Regression Parameters for Teaching Performance Variables; Grade 2 Mathematics Residual Scores

Performance Variable	|R|	$\sigma_{y.x}$	df	p	Prop. of SQ.
WD - 1	.16	.08	39	.32	.03
WD - 2	.002	.08	39	.99	.00
WD - 3	.07	.08	39	.64	.01
WD - 4	.37 (-.37)*	.08	39	.02	.14
WD - 5	.03	.08	39	.86	.00
RA - 1	.06	.08	39	.72	.003
RA - 2	.07	.08	39	.65	.01
RA - 3	.19	.08	39	.24	.03
RA - 4	.06	.08	39	.71	.003
AP - 1	.09	.08	39	.59	.01
AP - 2	.02	.08	39	.91	.000
AP - 3	.01	.08	39	.94	.00
AP - 5	.14	.08	39	.38	.02
AP - 6	.18	.08	39	.26	.03
AP - 7	.33 (-.33)	.08	39	.03	.11
AP - 8	.04	.08	39	.81	.001
AP - 9	.17	.08	39	.30	.03
AP - 10	.25	.08	39	.12	.06
AP - 11	.10	.08	39	.53	.002
AP - 12	.20	.08	39	.22	.01
AP - 13	.03	.08	39	.84	.000
AP - 14	.13	.08	39	.43	.02

*Note that the absolute value of R is given. If R is significant, and if r between the variable and Spring total Score was negative, the value of that r is given in the parentheses.

related to variety of instructional material, are significant; AP-6, a context measure (teacher-groups) is significant; and AP-12, direct instructional responses is significant (p-values less than or equal to .10 were considered here). Thus, four variables are significant. (In a set of 22, at least one variable is likely to be significant by chance alone.) In Mathematics, WD-4 again is significant as is AP-7, a context variable (teacher-class). Note that some of the relations are negative.

Variables Grouped by Instrument

Tables A.5, A.6 and A.7 present the analyses with the variables grouped by instrument. In Reading, WD-variables and RAMOS variables relate significantly ($p < .10$) to the dependent variable. WD-4, R-2 and R-3 have significant regression weights ($T = 1.65$, $p \leq .05$). In Mathematics, none of these groups is significantly related to the dependent variable.

When studying these tables the reader should note the significance of the regression weight for the fall score (concomitant variable) and its magnitude relative to the regression weights for the performance variables. Obviously fall scores make the largest contribution to a prediction of spring scores.

In Tables A.8, A.9, A.10 and A.11 the APPLE variables are broken up into groups where AP-1 to AP-3 are Pupil Behavior variables; AP-5 to AP-7 are context variables; AP-8 to AP-11 are teaching activity variables; AP-12 to AP-14 are teacher response variables. None of these groups is significantly related to residual scores. Again the regression weights of the fall scores are significant. The teacher response variables approach significance for Reading.

Table A.5

Regression of Spring Scores with Fall Scores as the Concomitant Variable on Teaching Performance Variables, Work Diary Scores; Grade 2 Reading and Mathematics ($N_R = 40$; $N_M = 41$).

GRADE 2 READING K 5

THE DEPENDENT VARIABLE IS TOTREADS. THE MULTIPLE CORRELATION IS 0.4987. THE STANDARD ERROR OF ESTIMATE= 0.0561

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		39.			
UNDER NULL HYPOTHESIS	0.1383	1.0000	38.			
DUE TO HYPOTHESIS	0.0344	0.2487	5.	0.0069	2.1848	0.0797
ERROR	0.1039	0.7513	33.	0.0031		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 33.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOTREADF		0.8933	0.0614	14.5490		0.1648
INDEPENDENT VARIABLES						
WD 1	0.2237	-0.0841	0.0589	-1.4265	-0.0463	0.0746
WD-2	-0.0756	-0.0277	0.0611	-0.4543	-0.0047	0.1371
WD 3	0.0840	0.0313	0.0633	0.4945	-0.0056	0.2114
WD 4	-0.4006	-0.1492	0.0602	-2.4794	-0.1400	0.1277
WD-5	0.1341	0.0512	0.0689	0.7430	-0.0126	0.3011

GRADE 2 MATH K 4

THE DEPENDENT VARIABLE IS TOTMATHS. THE MULTIPLE CORRELATION IS 0.4224. THE STANDARD ERROR OF ESTIMATE= 0.0308

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		40.			
UNDER NULL HYPOTHESIS	0.2700	1.0000	39.			
DUE TO HYPOTHESIS	0.0482	0.1784	5.	0.0096	1.4770	0.2230
ERROR	0.2218	0.8216	34.	0.0065		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 34.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOTMATHF		0.8155	0.0843	9.6769		0.0813
INDEPENDENT VARIABLES						
WD-1	-0.0470	-0.0249	0.0923	-0.2693	-0.0018	0.2069
WD-2	0.1583	0.0826	0.0909	0.9081	-0.0199	0.2052
WD-3	0.0797	0.0414	0.0844	0.4905	-0.0058	0.0838
WD-4	-0.4352	-0.2273	0.0922	-2.4643	-0.1467	0.2251
WD-5	0.0602	0.0316	0.0843	0.3748	-0.0034	0.0632

Table A.6

Regression of Spring Scores with Fall Scores as the Concomitant Variable on Teaching Performance Variables, RAMOS Scores; Grade 2 Reading and Mathematics (N_R = 40; N_M = 41).

GRADE 2 READING L 5

THE DEPENDENT VARIABLE IS TOTREADS, THE MULTIPLE CORRELATION IS 0.5459, THE STANDARD ERROR OF ESTIMATE= 0.0534

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		39.			
UNDER NULL HYPOTHESIS	0.1383	1.0000	38.			
DUE TO HYPOTHESIS	0.0412	0.2981	4.	0.0103	3.6092	0.0148
ERROR	0.0971	0.7019	34.	0.0029		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 34.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOTREADF		0.9446	0.0553	17.0887		0.0656
INDEPENDENT VARIABLES						
RAMOS 1	-0.2035	-0.0783	0.0705	-1.1167	-0.0257	0.4075
RAMOS-2	-0.3789	-0.1416	0.0844	-1.6782	-0.0581	0.5950
RAMOS-3	0.6660	0.2526	0.0820	3.0814	-0.1960	0.5581
RAMOS-4	-0.0964	-0.0362	0.0760	-0.4763	-0.0047	0.4963

GRADE 2 MATH L 4

THE DEPENDENT VARIABLE IS TOTMATHS, THE MULTIPLE CORRELATION IS 0.2324, THE STANDARD ERROR OF ESTIMATE= 0.0854

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		40.			
UNDER NULL HYPOTHESIS	0.2700	1.0000	39.			
DUE TO HYPOTHESIS	0.0146	0.0540	4.	0.0036	0.4997	0.7360
ERROR	0.2554	0.9460	35.	0.0073		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 35.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOTMATHF		0.8511	0.0913	9.3247		0.1241
INDEPENDENT VARIABLES						
RAMOS-1	0.1596	0.0859	0.1405	0.6115	-0.0101	0.6032
RAMOS-2	0.1168	0.0635	0.1328	0.4783	-0.0062	0.5465
RAMOS-3	-0.3688	-0.1950	0.1464	-1.3318	-0.0479	0.6475
RAMOS-4	-0.0371	-0.0194	0.1117	-0.1737	-0.0008	0.4089

1253

Table A.7

Regression of Spring Scores with Fall Scores as the Concomitant Variable on Teaching Performance Variables, APPLE Scores; Grade 2 Reading and Mathematics (N_R = 40; N_M = 41).

GRADE 2 READING M 5

THE DEPENDENT VARIABLE IS TOTREADS, THE MULTIPLE CORRELATION IS 0.6580, THE STANDARD ERROR OF ESTIMATE= 0.0560

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		39.			
UNDER NULL HYPOTHESIS	0.1383	1.0000	38.			
DUE TO HYPOTHESIS	0.0599	0.4330	13.	0.0046	1.4685	0.1980
ERROR	0.0784	0.5670	25.	0.0031		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 25 D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOTREADF		0.9472	0.0675	14.0256		0.3123
INDEPENDENT VARIABLES						
APPLE-1	0.1251	-0.0466	0.0788	-0.5906	-0.0079	0.4944
APPLE-2	-0.2793	-0.1058	0.0696	-1.1809	-0.0316	0.5944
APPLE-3	0.5472	-0.2061	0.0901	-2.2388	-0.1188	0.6032
APPLE-5	0.3542	0.1317	0.0675	1.9525	-0.0864	0.3108
APPLE-6	0.5411	0.2025	0.0803	2.5069	-0.1425	0.5131
APPLE-7	0.3593	0.1435	0.1002	1.4325	-0.0465	0.6394
APPLE-8	-0.0803	-0.0338	0.0649	-0.5206	-0.0061	0.2466
APPLE-9	0.3823	0.1423	0.0754	1.8867	-0.0807	0.4475
APPLE-10	0.1540	-0.0573	0.0721	-0.7945	-0.0143	0.3960
APPLE-11	0.1614	0.0628	0.0726	0.8650	-0.0170	0.3485
APPLE-12	0.4049	0.1506	0.0691	2.1788	-0.1077	0.3431
APPLE-13	0.1697	-0.0640	0.0875	-0.7306	-0.0121	0.5799
APPLE-14	-0.0654	-0.0244	0.0710	-0.3442	-0.0027	0.3725

Table A.7 (Continued)

GRADE 2 MATH M 4

THE DEPENDENT VARIABLE IS TOTMATHS. THE MULTIPLE CORRELATION IS 0.5372. THE STANDARD ERROR OF ESTIMATE= 0.0860

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		40.			
UNDER NULL HYPOTHESIS	0.2700	1.0000	39.			
DUE TO HYPOTHESIS	0.0779	0.2886	13.	0.0060	0.8113	0.6445
ERROR	0.1921	0.7114	26.	0.0074		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 26 D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOTMATHF		0.8444	0.1024	8.2488		0.2950
INDEPENDENT VARIABLES						
APPLE-1	0.1393	0.0724	0.1349	0.5367	-0.0079	0.5935
APPLE-2	0.0225	0.0118	0.1240	0.0953	-0.0002	0.5076
APPLE-3	0.4156	0.2219	0.1364	1.5918	-0.0693	0.5585
APPLE-5	-0.2138	-0.1138	0.1418	-0.8030	-0.0176	0.6122
APPLE-6	-0.0257	-0.0133	0.1552	-0.0859	-0.0002	0.6534
APPLE-7	-0.4969	-0.2585	0.1998	-1.2941	-0.0458	0.8144
APPLE-8	-0.0880	-0.0447	0.1093	-0.4087	-0.0046	0.3816
APPLE-9	0.0589	0.0317	0.1401	0.2260	-0.0014	0.5969
APPLE-10	-0.3255	-0.1693	0.1002	-1.6899	-0.0781	0.2624
APPLE-11	-0.2403	-0.1251	0.1060	-1.2179	-0.0406	0.3416
APPLE-12	-0.3146	-0.1636	0.1158	-1.4128	-0.0546	0.4487
APPLE-13	0.1018	0.0530	0.1126	0.4710	-0.0061	0.4141
APPLE-14	-0.0504	-0.0270	0.1111	-0.2430	-0.0016	0.3648

1294

Table A.8

Regression of Spring Scores with Fall Scores as the Concomitant Variable on Teaching Performance Variables, APPLE Scores-Pupil Behavior; Grade 2 Reading and Mathematics (N_R = 40; N_M = 41).

GRADE 2 READING N 5

THE DEPENDENT VARIABLE IS TOTREADS, THE MULTIPLE CORRELATION IS 0.2982, THE STANDARD ERROR OF ESTIMATE= 0.0600

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		39.			
UNDER NULL HYPOTHESIS	0.1383	1.0000	38.			
DUE TO HYPOTHESIS	0.0123	0.0889	3.	0.0041	1.1385	0.3470
ERROR	0.1260	0.9111	35.	0.0036		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 35 D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOTREADF		0.9407	0.0615	15.2927		0.0486
INDEPENDENT VARIABLES						
APPLE-1	0.1261	0.0469	0.0658	0.7137	-0.0133	0.1663
APPLE-2	-0.2293	-0.0869	0.0693	-1.2526	-0.0408	0.2234
APPLE-3	0.1017	-0.0383	0.0632	-0.6060	-0.0096	0.0759

GRADE 2 MATH N 4

THE DEPENDENT VARIABLE IS TOTMATHS, THE MULTIPLE CORRELATION IS 0.1006, THE STANDARD ERROR OF ESTIMATE= 0.0802

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		40.			
UNDER NULL HYPOTHESIS	0.2700	1.0000	39.			
DUE TO HYPOTHESIS	0.0027	0.0101	3.	0.0009	0.1228	0.9461
ERROR	0.2673	0.9899	36.	0.0074		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 36 D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOTMATHF		0.8596	0.0902	9.5250		0.0884
INDEPENDENT VARIABLES						
APPLE-1	-0.1082	-0.0563	0.0947	-0.5943	-0.0097	0.1706
APPLE-2	-0.0478	-0.0251	0.0915	-0.2747	-0.0021	0.0912
APPLE-3	-0.0270	-0.0144	0.0945	-0.1527	-0.0006	0.1223

Table A.9

Regression of Spring Scores with Fall Scores as the Concomitant Variable on Teaching Performance Variables, APPLE Scores - Contexts; Grade 2 Reading and Mathematics ($N_R = 40$; $N_M = 41$).

GRADE 2 READING 0 5

THE DEPENDENT VARIABLE IS TOTREADS, THE MULTIPLE CORRELATION IS 0.3334, THE STANDARD ERROR OF ESTIMATE= 0.0593

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		39.			
UNDER NULL HYPOTHESIS	0.1383	1.0000	38.			
DUE TO HYPOTHESIS	0.0154	0.1112	3.	0.0051	1.4590	0.2425
ERROR	0.1229	0.8888	35.	0.0035		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 35.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOTREADF		0.9361	0.0641	14.6035		0.1452
INDEPENDENT VARIABLES						
APPLE-5	0.1135	0.0441	0.0626	0.7044	-0.0126	0.1029
APPLE-6	0.3562	0.1333	0.0646	2.0634	-0.1081	0.1480
APPLE-7	0.1523	0.0608	0.0715	0.8505	-0.0184	0.2076

GRADE 2 MATH 0 4

THE DEPENDENT VARIABLE IS TOTMATHS, THE MULTIPLE CORRELATION IS 0.3376, THE STANDARD ERROR OF ESTIMATE= 0.0815

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		40.			
UNDER NULL HYPOTHESIS	0.2700	1.0000	39.			
DUE TO HYPOTHESIS	0.0308	0.1140	3.	0.0103	1.5441	0.2198
ERROR	0.2392	0.8860	36.	0.0066		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 36.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOTMATHF		0.8651	0.0854	10.1273		0.0894
INDEPENDENT VARIABLES						
APPLE-5	-0.0170	-0.0091	0.0990	-0.0915	-0.0002	0.2854
APPLE-6	0.0207	0.0168	0.0966	0.1113	-0.0003	0.2874
APPLE-7	-0.3348	-0.1742	0.1098	-1.5857	-0.0619	0.4479

Table A.10

Regression of Spring Scores with Fall Scores as the Concomitant Variable on Teaching Performance Variables, APPLE Scores - Teacher Activities; Grade 2 Reading and Mathematics (N_R = 40; N_M = 41).

GRADE 2 READING P 5

THE DEPENDENT VARIABLE IS TOTREADS, THE MULTIPLE CORRELATION IS 0.2615, THE STANDARD ERROR OF ESTIMATE= 0.0616

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		39.			
UNDER NULL HYPOTHESIS	0.1383	1.0000	38.			
DUE TO HYPOTHESIS	0.0095	0.0684	4.	0.0024	0.6242	0.6485
ERROR	0.1288	0.9316	34.	0.0038		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 34.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOTREADF		0.9027	0.0646	13.9634		0.0933
INDEPENDENT VARIABLES						
APPLE-8	0.1906	-0.0713	0.0655	-1.0882	-0.0324	0.1070
APPLE-9	0.1316	0.0490	0.0696	0.7041	-0.0136	0.2162
APPLE-10	0.0599	-0.0223	0.0649	-0.3436	-0.0032	0.0993
APPLE-11	0.1420	-0.0553	0.0662	-0.8348	-0.0191	0.0529

GRADE 2 MATH P 4

THE DEPENDENT VARIABLE IS TOTMATHS, THE MULTIPLE CORRELATION IS 0.3216, THE STANDARD ERROR OF ESTIMATE= 0.0832

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		40.			
UNDER NULL HYPOTHESIS	0.2700	1.0000	39.			
DUE TO HYPOTHESIS	0.0260	0.1035	4.	0.0070	1.0105	0.4153
ERROR	0.2421	0.8965	35.	0.0069		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 35.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOTMATHF		0.8658	0.0869	10.0143		0.0833
INDEPENDENT VARIABLES						
APPLE-8	-0.0143	-0.0074	0.0855	-0.0868	-0.0002	0.0541
APPLE-9	-0.1306	-0.0702	0.0907	-0.7743	-0.0154	0.0999
APPLE-10	-0.2531	-0.1316	0.0878	-1.4993	-0.0576	0.1009
APPLE-11	-0.1624	-0.0948	0.0866	-1.0952	-0.0307	0.0763

Table A.11

Regression of Spring Scores with Fall Scores as the Concomitant Variable on Teaching Performance Variables, APPLE Scores - Teacher Responses; Grade 2 Reading and Mathematics ($N_R = 40$; $N_M = 41$).

GRADE 2 READING Q 5

THE DEPENDENT VARIABLE IS TOTREADS, THE MULTIPLE CORRELATION IS 0.3937, THE STANDARD ERROR OF ESTIMATE= 0.0578

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		39.			
UNDER NULL HYPOTHESIS	0.1383	1.0000	38.			
DUE TO HYPOTHESIS	0.0214	0.1550	3.	0.0071	2.1406	0.1127
ERROR	0.1169	0.8450	35.	0.0033		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 35.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOTREADF		0.9231	0.0588	15.7113		0.0328
INDEPENDENT VARIABLES						
APPLE-12	0.3489	0.1298	0.0590	2.2014	-0.1170	0.0387
APPLE-13	-0.0881	-0.0332	0.0591	-0.5623	-0.0076	0.0174
APPLE-14	0.1236	-0.0462	0.0591	-0.7811	-0.0147	0.0361

GRADE 2 MATH Q 4

THE DEPENDENT VARIABLE IS TOTMATHS, THE MULTIPLE CORRELATION IS 0.2762, THE STANDARD ERROR OF ESTIMATE= 0.0832

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		40.			
UNDER NULL HYPOTHESIS	0.2700	1.0000	39.			
DUE TO HYPOTHESIS	0.0206	0.0763	3.	0.0069	0.9908	0.4081
ERROR	0.2494	0.9237	36.	0.0069		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 36.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOTMATHF		0.8812	0.0864	10.1938		0.0729
INDEPENDENT VARIABLES						
APPLE-12	-0.2544	-0.1322	0.0869	-1.5222	-0.0595	0.0616
APPLE-13	-0.0161	-0.0064	0.0839	-0.1003	-0.0003	0.0092
APPLE-14	-0.1991	-0.1066	0.0898	-1.1861	-0.0361	0.0897

Multiple Regressions of Mean Gain Scores on
Teacher Performance Variables; Grade 2 Reading and Mathematics

In the analyses presented in this section the mean gain scores, fall to spring, were regressed on performance variables. Tables A.12 and A.13 present these results when all the performance variables were entered in the regression analysis. As can be seen the results are not significant for Reading.

For Mathematics, however, the results are significant ($p \leq .07$). The t - statistic for the regression weights is significant if $t \geq 1.65$. WD-2 (variety of skills taught), WD-3 (number of pupils taught directly by teacher), R-1 (time spent on teaching and preparing for teaching), AP-3 (pupil behavior-task involvement) and AP-13 (social control and task-orienting teaching behavior) are all significantly and positively related to mean gain scores. Thus the teachers who teach a greater variety of skills, do more of the instructing themselves, spend more time teaching mathematics and who spend more time keeping children task-oriented have classes which make greater gains.

The following variables have significant negative regression weights: WD-4 (complexity of organizational structure), WD-5 (variety of materials), R-4 (variety of instructional activities), AP-2 (inattentiveness), AP-6 (teacher-group), AP-9 (interactive teaching behaviors), AP-11 (location of teacher). AP-6 (teacher-groups) and WD-4 is a combination in which the teacher is using groups and doing all or most of the instructing (high scores on WD-4 means more instruction by the teacher). In this context, more materials (WD-5) indicate a situation in which the teacher is trying to manage a complex of groups and materials. AP-11 (high scores mean

Table A.12

Regression of Class Mean Gain Scores on Teacher Performances Variables
Grade 2 Reading (N = 40)

THE DEPENDENT VARIABLE IS TOT READ. THE MULTIPLE CORRELATION IS 0.6582. THE STANDARD ERROR OF ESTIMATE= 0.1826

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		39.			
UNDER NULL HYPOTHESIS	1.0000	1.0000	39.			
DUE TO HYPOTHESIS	0.4332	0.4332	22.	0.0197	0.5905	0.8779
ERROR	0.5668	0.5668	17.	0.0333		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 17.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
INDEPENDENT VARIABLES						
WD-----1	0.2371	0.2371	0.3586	0.6613	-0.0146	0.7407
WD-----2	0.4750	0.4750	0.3099	1.5329	-0.0783	0.6528
WD-----3	-0.1025	-0.1025	0.2909	-0.3522	-0.0041	0.6060
WD-----4	-0.2826	-0.2826	0.2923	-0.9668	-0.0312	0.6098
WD-----5	-0.0123	-0.0123	0.3625	-0.0339	-0.0000	0.7463
RANDS--1	0.1822	0.1822	0.3708	0.4913	-0.0060	0.7575
RANDS--2	-0.5447	-0.5447	0.4001	-1.3613	-0.0818	0.7918
RANDS--3	0.4669	0.4669	0.3749	1.2455	-0.0517	0.7628
RANDS--4	-0.1113	-0.1113	0.3258	-0.3415	-0.0039	0.6858
APPLE--1	0.1130	0.1130	0.2841	0.3979	-0.0053	0.5869
APPLE--2	-0.0435	-0.0435	0.3696	-0.1177	-0.0005	0.7560
APPLE--3	-0.3093	-0.3093	0.4675	-0.6616	-0.0146	0.8474
APPLE--5	0.1831	0.1831	0.2594	0.7059	-0.0166	0.5045
APPLE--6	0.2102	0.2102	0.3292	0.6628	-0.0146	0.6924
APPLE--7	0.5779	0.5779	0.4187	1.3803	-0.0635	0.8098
APPLE--8	0.0673	0.0673	0.2476	0.2720	-0.0025	0.4560
APPLE--9	0.1433	0.1433	0.3348	0.4281	-0.0001	0.7025
APPLE-10	-0.0617	-0.0617	0.2918	-0.2799	-0.0026	0.6084
APPLE-11	-0.0306	-0.0306	0.3014	-0.1017	-0.0002	0.6330
APPLE-12	0.2727	0.2727	0.3390	0.8045	-0.0216	0.7099
APPLE-13	-0.5208	-0.5208	0.4015	-1.2970	-0.0561	0.7932
APPLE-14	0.0166	0.0166	0.2788	0.0595	-0.0001	0.5711

Table A.13

Regression of Class Mean Gain Scores on Teacher Performances Variables
Grade 2 Mathematics (N = 41).

THE DEPENDENT VARIABLE IS MATH TOT. THE MULTIPLE CORRELATION IS 0.8415. THE STANDARD ERROR OF ESTIMATE 0.1273

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		40.			
UNDER NULL HYPOTHESIS	1.0000	1.0000	40.			
DUE TO HYPOTHESIS	0.7082	0.7082	22.	0.0322	1.9854	0.0720
ERROR	0.2918	0.2918	18.	0.0162		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 18.D.F.	CONTRIBUTION TO R-S..	MEASURE OF COLLINEARITY
INDEPENDENT VARIABLES						
WD-----1	0.2107	0.2107	0.1954	1.0781	-0.0188	0.5755
WD-----2	0.6462	0.6462	0.2289	2.8233	-0.1292	0.6905
WD-----3	0.3516	0.3516	0.1624	2.1648	-0.0750	0.3855
WD-----4	-0.9439	-0.9439	0.2399	-3.9346	-0.2910	0.7183
WD-----5	-0.3611	-0.3611	0.1691	-2.1349	-0.0739	0.4332
RAPOS--1	0.8401	0.8401	0.2918	2.8788	-0.1344	0.8096
RAPOS--2	-0.1312	-0.1312	0.2528	-0.5190	-0.0044	0.7462
RAPOS--3	-0.3175	-0.3175	0.3148	-1.0087	-0.0165	0.8364
RAPOS--4	-0.9007	-0.9007	0.2707	-3.3273	-0.1795	0.7767
APPLE--1	0.0212	0.0212	0.2419	0.0875	-0.0001	0.7230
APPLE--2	-0.5656	-0.5656	0.2170	-2.6062	-0.1101	0.6557
APPLE--3	0.5075	0.5075	0.2610	1.9443	-0.0513	0.7621
APPLE--5	-0.2032	-0.2032	0.2403	-0.8455	-0.0116	0.7192
APPLE--6	-0.9645	-0.9645	0.3188	-3.0248	-0.1546	0.8405
APPLE--7	-0.3949	-0.3949	0.3320	-1.1894	-0.0229	0.8529
APPLE--8	-0.0476	-0.0476	0.1702	-0.2796	-0.0013	0.4405
APPLE--9	-0.9827	-0.9827	0.2802	-3.5069	-0.1994	0.7935
APPLE-10	-0.0694	-0.0694	0.1787	-0.3882	-0.0024	0.4922
APPLE-11	-0.3374	-0.3374	0.1929	-1.7486	-0.0496	0.5644
APPLE-12	-0.1853	-0.1853	0.1831	-1.0120	-0.0166	0.5106
APPLE-13	0.4790	0.4790	0.2186	2.1913	-0.0779	0.6607
APPLE-14	0.1023	0.1023	0.1867	0.5482	-0.0049	0.5349

"at board or at desk") and AP-9 are brief instructional behaviors such as answering or checking. Thus a teacher who has high scores on all these variables is one who is attempting to manage a group by instructing in the group (AP-6), but whose instruction is brief question-answering and checking episodes, (AP-9 and WD-4); is using a diversity of materials (WD-5) and is using a variety of instructional activities (R-4). This situation is obviously ineffective. The negative contribution of AP-2 (inattentiveness) suggests that the system is not working.

Tables A.14 and A.14a present the values of $\underline{r}$ and related parameters for each teaching performance variable when mean gain scores are regressed against it. For Reading only WD-4 (organizational structure) was significant. For Mathematics R-2 (diversity of instructional purposes), R-3 (variety of materials) and AP-7 (teacher-class) were significant ($p \leq .10$).

We omit tables showing the results of the analyses in which mean gain scores were regressed against the performance variables grouped by instrument (as in Tables A.5-A.11). No significant relations were found in any of these analyses.

These analyses show very little with the exception of the relations appearing in Mathematics. These results should not be too surprising because fall scores correlate substantially with spring scores. Also these analyses essentially ignore the relations among the variables.

In the following section the stepwise regressions are presented. In the tables presented to this point the reader will have noted a column labeled "contribution to R^2." The number opposite a variable in this column is the amount by which R^2 would be reduced if that variable were removed from the analysis. In the stepwise regressions the variables were entered in the order of magnitude of this value.

Table A.14

Mean Gain Scores Regressed Against Each Teaching Performance Variable: Grade 2 Reading

Performance Variable	|R|	$\sigma_{y \cdot x}$	df	p	Prop. of SQ.
WD - 1	.07	.16	39	.66	.01
WD - 2	.06	.16	39	.72	.00
WD - 3	.08	.16	39	.61	.01
WD - 4	.27 (-.27) *	.16	39	.09	.07
WD - 5	.01	.16	39	.93	.00
RA - 1	.19	.16	39	.24	.04
RA - 2	.18	.16	39	.26	.03
RA - 3	.19	.16	39	.23	.04
RA - 4	.10	.16	39	.54	.01
AP - 1	.22	.16	39	.16	.05
AP - 2	.24	.16	39	.13	.06
AP - 3	.01	.16	39	.96	.00
AP - 5	.02	.16	39	.91	.00
AP - 6	.22	.16	39	.18	.05
AP - 7	.11	.16	39	.50	.01
AP - 8	.15	.16	39	.37	.02
AP - 9	.01	.16	39	.96	.00
AP - 10	.07	.16	39	.68	.00
AP - 11	.06	.16	39	.70	.00
AP - 12	.20	.16	39	.21	.04
AP - 13	.01	.16	39	.95	.00
AP - 14	.05	.16	39	.75	.00

*Note that the absolute value of R is given. If R is significant, and if r between the variable and Spring total Score was negative, the value of that r is given in the parentheses.

Table A.14a

Mean Gain Scores Regressed Against Each Teaching Performance Variable: Grade 2 Mathematics

Performance Variable	|R|	$\sigma_{y \cdot x}$	df	p	Prop. of SQ.
WD - 1	.06	.16	40	.71	.00
WD - 2	.02	.16	40	.89	.00
WD - 3	.04	.16	40	.81	.00
WD - 4	.19	.16	40	.23	.04
WD - 5	.02	.16	40	.88	.00
RA - 1	.13	.16	40	.40	.02
RA - 2	.29 (-.29)*	.15	40	.07	.08
RA - 3	.28 (-.28)	.15	40	.07	.08
RA - 4	.21	.16	40	.17	.05
AP - 1	.08	.16	40	.61	.01
AP - 2	.22	.16	40	.16	.05
AP - 3	.09	.16	40	.55	.01
AP - 5	.03	.16	40	.86	.00
AP - 6	.05	.16	40	.75	.00
AP - 7	.27 (-.27)	.15	40	.08	.07
AP - 8	.19	.16	40	.23	.04
AP - 9	.21	.16	40	.18	.05
AP - 10	.18	.16	40	.25	.03
AP - 11	.06	.16	40	.72	.00
AP - 12	.17	.16	40	.29	.03
AP - 13	.13	.16	40	.42	.02
AP - 14	.20	.16	40	.20	.04

*Note that the absolute value of R is given. If R is significant, and if r between the variable and Spring total Score was negative, the value of that r is given in the parentheses.

Stepwise regressions tell us the relative predictive power of the variables. Variables are entered successively until R^2 is no longer significant. The variables entered to this point as represented in the regression equation with their regression weights constitute the best predictive relation between the variable and the criterion when its correlation with other variables is considered.

Stepwise Regressions - Grade 2

Reading - Residual Scores

Tables A.15, A.16 and A.17 present the stepwise regressions for Reading. Table A.15 is the stepwise regression with one variable, A.16 with three variables, and in A.17 is the last stepwise regression for which there was a significant F-value. Adding variables beyond this point does not contribute to the prediction. But between step 3 and step 11, p has increased, so we will use step 3.

The three variables listed in Table A.16 have a multiple R of .59 with residual scores and account for 35 percent of the variance in the residual scores. Between the analysis presented in Table A.15 and that in Table A.16, R has increased from .4254 to .5926 and the mean square has dropped from .0250 to .0162.

The variables contributing significantly and their interrelations are listed below:

Table A.15

Stepwise Regression of Residual Scores on Teacher Performance Variables (Step 1)
Grade 2 Reading (N = 40)

GRADE 2 READING V

THE DEPENDENT VARIABLE IS TOTREADS. THE MULTIPLE CORRELATION IS 0.4254. THE STANDARD ERROR OF ESTIMATE= 0.0553

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		39.			
UNDER NULL HYPOTHESIS	0.1383	1.0000	36.			
DUE TO HYPOTHESIS	0.0250	0.1810	1.	0.0250	8.1757	0.0069
ERROR	0.1133	0.8190	37.	0.0031		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 37.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOTREADF		0.9186	0.0554	16.5713		0.0037
INDEPENDENT VARIABLES						
WD-4	-0.4254	-0.1585	0.0554	-2.8593	-0.1810	0.0
OTHER VARIABLES				NOW 36.D.F.		
WD-2	-0.0404	-0.0152	0.0592	-0.2564	0.0015	0.0839
WD-3	0.1231	0.0459	0.0557	0.8236	0.0151	0.0010
WD-1	-0.1847	-0.0694	0.0563	-1.2335	0.0332	0.0262
WD-5	0.1132	0.0433	0.0587	0.7371	0.0122	0.0503
RAMOS-1	-0.1478	-0.0559	0.0582	-0.9594	0.0204	0.0652
RAMOS-2	-0.0953	-0.0356	0.0566	-0.6293	0.0089	0.0193
RAMOS-3	0.2508	0.0951	0.0555	1.7149	0.0619	0.0163
RAMOS-4	0.0871	0.0327	0.0566	0.5779	0.0075	0.0068
APPLE-1	0.1807	0.0673	0.0552	1.2181	0.0324	0.0069
APPLE-2	-0.1496	-0.0567	0.0586	-0.9678	0.0208	0.0721
APPLE-3	-0.1209	-0.0455	0.0573	-0.7944	0.0141	0.0348
APPLE-5	0.0007	0.0002	0.0565	0.0043	0.0000	0.0156
APPLE-6	0.1356	0.0508	0.0622	0.8163	0.0149	0.1910
APPLE-7	0.1962	0.0783	0.0643	1.2181	0.0324	0.1576
APPLE-8	-0.1251	-0.0468	0.0561	-0.8341	0.0155	0.0081
APPLE-9	0.0246	0.0092	0.0567	0.1615	0.0006	0.0196
APPLE-10	-0.0797	-0.0296	0.0564	-0.5257	0.0062	0.0178
APPLE-11	-0.0194	-0.0075	0.0634	-0.1191	0.0003	0.1425
APPLE-12	0.2314	0.0861	0.0591	1.4566	0.0456	0.1490
APPLE-13	0.0178	0.0067	0.0579	0.1161	0.0003	0.0376
APPLE-14	-0.1994	-0.0745	0.0550	-1.3549	0.0397	0.0007

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Table A.16

Stepwise Regression of Residual Scores on Teacher Performance Variables (Step 3)
Grade 2 Reading (N + 40)

GRADE 2 READING V

THE DEPENDENT VARIABLE IS TOTREADS. THE MULTIPLE CORRELATION IS 0.5926. THE STANDARD ERROR OF ESTIMATE= 0.0506

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		39.			
UNDER FULL HYPOTHESIS	0.1383	1.0000	38.			
DUE TO HYPOTHESIS	0.0486	0.3511	3.	0.0162	6.3134	0.0015
ERROR	0.0897	0.6489	35.	0.0026		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 35.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOTREADF		0.9445	0.0519	18.1991		0.0482
INDEPENDENT VARIABLES						
WD-4	-0.2981	-0.1111	0.0532	-2.0873	-0.0808	0.0912
RAMOS-3	0.5262	0.1995	0.0677	2.9492	-0.1612	0.4176
RAMOS-2	-0.4319	-0.1614	0.0668	-2.4170	-0.1083	0.4193
OTHER VARIABLES				NOW 34.D.F.		
WD-1	-0.1455	-0.0547	0.0521	-1.0491	0.0203	0.0396
WD-5	0.1015	0.0388	0.0538	0.7202	0.0097	0.0532
RAMOS-1	-0.1259	-0.0476	0.0679	-0.7001	0.0092	0.4179
WD-3	0.0816	0.0304	0.0517	0.5879	0.0065	0.0186
WD-2	0.0543	0.0204	0.0566	0.3610	0.0025	0.1607
RAMOS-4	-0.0783	-0.0294	0.0721	-0.4080	0.0032	0.4848
APPLE-1	0.1569	0.0584	0.0511	1.1423	0.0240	0.0263
APPLE-2	-0.1856	-0.0703	0.0532	-1.3213	0.0317	0.0796
APPLE-3	-0.1250	-0.0471	0.0547	-0.8606	0.0138	0.1147
APPLE-5	0.0211	0.0079	0.0521	0.1509	0.0004	0.0290
APPLE-6	0.0271	0.0101	0.0592	0.1713	0.0006	0.2383
APPLE-7	0.1476	0.0589	0.0599	0.9842	0.0180	0.1747
APPLE-8	-0.0266	-0.0100	0.0544	-0.1829	0.0006	0.1000
APPLE-9	0.0128	0.0048	0.0533	0.0896	0.0002	0.0686
APPLE-10	-0.0496	-0.0185	0.0527	-0.3502	0.0023	0.0534
APPLE-11	-0.0233	-0.0090	0.0584	-0.1550	0.0005	0.1523
APPLE-12	0.1064	0.0396	0.0581	0.6810	0.0087	0.2282
APPLE-13	-0.0280	-0.0106	0.0535	-0.1971	0.0007	0.0558
APPLE-14	-0.1783	-0.0666	0.0507	-1.3145	0.0314	0.0133

Table A.17

Stepwise Regression of Residual Scores on Teacher Performance Variables (Step 11)
Grade 2 Reading (N = 40)

GRADE 2 READING

THE DEPENDENT VARIABLE IS TOTREADS. THE MULTIPLE CORRELATION IS 0.7083. THE STANDARD ERROR OF ESTIMATE= 0.0505

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		39.			
UNDER NULL HYPOTHESIS	0.1383	1.0000	38.			
DUE TO HYPOTHESIS	0.0694	0.5016	11.	0.0063	2.4706	0.0272
ERROR	0.0689	0.4984	27.	0.0026		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 27 D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOTREADF		0.9711	0.0607	16.0009		0.3070
INDEPENDENT VARIABLES						
WD-4	-0.3208	-0.1233	0.0655	-1.8828	-0.0654	0.4021
RAMOS-3	0.4714	0.1788	0.0719	2.4865	-0.1141	0.4865
RAMOS-2	-0.3544	-0.1325	0.0710	-1.8661	-0.0643	0.4883
APPLE-2	-0.3158	-0.1196	0.0605	-1.9756	-0.0720	0.2775
APPLE-3	-0.2112	-0.0795	0.0663	-1.2002	-0.0266	0.4036
WD-1	-0.2247	-0.0844	0.0628	-1.3447	-0.0334	0.3590
APPLE-7	0.1858	0.0742	0.0653	1.1373	-0.0239	0.3085
APPLE-5	0.1985	0.0738	0.0586	1.2584	-0.0292	0.2578
APPLE-6	0.1558	0.0583	0.0687	0.8486	-0.0133	0.4520
APPLE-11	0.2081	0.0810	0.0722	1.1219	-0.0232	0.4633
WD-5	0.1663	0.0635	0.0644	0.9861	-0.0179	0.3506
OTHER VARIABLES			NOW 26.D.F.			
RAMOS-1	-0.2181	-0.0824	0.0924	-0.8917	0.0148	0.6892
WD-2	-0.0205	-0.0077	0.0595	-0.1295	0.0003	0.2346
RAMOS-4	-0.0670	-0.0252	0.0869	-0.2896	0.0016	0.6431
WD-3	-0.0578	-0.0215	0.0713	-0.3024	0.0017	0.4777
APPLE-8	-0.0134	-0.0050	0.0666	-0.0751	0.0001	0.3950
APPLE-9	0.0793	0.0295	0.0716	0.4124	0.0032	0.4852
APPLE-10	-0.0244	-0.0091	0.0622	-0.1456	0.0004	0.3154
APPLE-1	0.0562	0.0209	0.0672	0.3112	0.0018	0.4149
APPLE-12	0.0886	0.0330	0.0653	0.5050	0.0048	0.3834
APPLE-13	-0.0968	-0.0365	0.0795	-0.4584	0.0040	0.5733
APPLE-14	-0.0771	-0.0288	0.0613	-0.4700	0.0042	0.2945

Reg. Wt. Sign	WD-4	R-3
(-) WD-4	-	
(+) R-3	-.11	-
(-) R-2	.26	.61

The sign in the left-hand column is the sign of the regression weight of the variable (See Table A.16).

The regression equation for this analysis is:

$$Y'_s = .94\ X_f - .11\ (WD\text{-}4) + .20\ (R\text{-}3) - .16\ (R\text{-}2)$$

Obviously fall scores make the greatest contribution to predicting spring scores. Note the "standardized regression weight" column in Table A.16. Observe that R-3's standardized regression weight is .5262, R-3 is making the next greatest contribution to the prediction.

A useful way to understand the meaning of this equation is to consider what kinds of scores would be needed for each variable to contribute to larger predicted scores. A variable preceded by a negative sign, for example, WD-4, should have a lower score. The list below shows which scores should be high or low.

Sign	Variable	Should be
-	WD-4	Low
+	R-3	High
-	R-2	Low

Using the significant predictors, we may say that higher scores are related to the use of diverse teaching materials (R-3). The reader should note that R-3 has been significant in the single variable correlations (See Table A.3) and in a stepwise regression (Table A.16):

WD-4 (organizational complexity) is a negative predictor. A high score means that the teacher is doing all or most of the teaching. R-2 (range of purposes being taught for) is weighted by practice - goals. Thus when the teacher is providing for practice and is the sole or principal instructor, this combination (high scores on both WD-4 and R-2) predicts lower residual scores.

WD-4 and R-2 correlate positively ($\underline{r}$ = .26) which suggests that there is some tendency for these performances to be associated. R-3 and R-2 correlate positively and substantially ($\underline{r}$ = .61). Thus teachers who are attempting to provide more instructional activities (R-2) also use more materials (R-3). But if the teacher is providing most or all of the instruction (WD-4), there the use of more materials (R-3) and trying to provide more instructional activities, particularly practice, (R-2) will predict lower residual scores.

Mathematics - Residual Scores

Tables A.18, A.19 and A.20 present the results of the stepwise regressions for Mathematics. At Step 6, R = .67, and R^2 = .45; these six variables account for 45 percent of the variance in spring scores when fall scores are partialled out. In the analysis in Table A.20, 15 variables have been entered in the stepwise regression which yielded an

Table A.18

Stepwise Regression of Residual Scores on Teacher Performance Variables (Step 1)
Grade 2 Mathematics (N = 41)

GRADE 2 MATH U

THE DEPENDENT VARIABLE IS TOTMATHS. THE MULTIPLE CORRELATION IS 0.3756. THE STANDARD ERROR OF ESTIMATE= 0.0781

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		40.			
UNDER NULL HYPOTHESIS	0.2700	1.0000	39.			
DUE TO HYPOTHESIS	0.0381	0.1410	1.	0.0381	6.2396	0.0169
ERROR	0.2319	0.8590	38.	0.0061		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 38.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOTMATHF		0.8348	0.0785	10.6323		0.0100
INDEPENDENT VARIABLES						
WD-4	-0.3756	-0.1961	0.0785	-2.4979	-0.1410	0.0
OTHER VARIABLES				NOW 37.D.F.		
WD-2	0.1628	0.0849	0.0846	1.0024	0.0227	0.1426
WD-3	0.1127	0.0585	0.0790	0.7414	0.0125	0.0093
WD-1	-0.0278	-0.0147	0.0866	-0.1695	0.0007	0.1343
WD-5	0.0901	0.0473	0.0805	0.5867	0.0079	0.0242
RAMOS-1	0.0117	0.0063	0.0835	0.0755	0.0001	0.0353
RAMOS-2	-0.0576	-0.0313	0.0828	-0.3786	0.0033	0.0016
RAMOS-3	-0.1207	-0.0638	0.0815	-0.7834	0.0140	0.0376
RAMOS-4	-0.0265	-0.0139	0.0799	-0.1735	0.0007	0.0084
APPLE-1	-0.1515	-0.0840	0.0794	-1.0580	0.0252	0.0330
APPLE-2	-0.0059	-0.0031	0.0802	-0.0385	0.0000	0.0011
APPLE-3	-0.0605	-0.0323	0.0826	-0.3910	0.0035	0.0335
APPLE-5	0.1567	0.0836	0.0802	1.0424	0.0245	0.0014
APPLE-6	0.0390	0.0208	0.0860	0.2358	0.0013	0.1535
APPLE-7	-0.3262	-0.1697	0.0742	-2.2860	0.1063	0.0008
APPLE-8	-0.1069	-0.0556	0.0798	-0.6960	0.0111	0.0209
APPLE-9	-0.2442	-0.1313	0.0805	-1.6315	0.0576	0.0336
APPLE-10	-0.3236	-0.1684	0.0756	-2.2265	0.1015	0.0311
APPLE-11	-0.0447	-0.0233	0.0801	-0.2903	0.0020	0.0237
APPLE-12	-0.2828	-0.1470	0.0771	-1.9066	0.0768	0.0391
APPLE-13	-0.0368	-0.0192	0.0793	-0.2414	0.0014	0.0001
APPLE-14	-0.1505	-0.0805	0.0806	-0.9995	0.0226	0.0034

Table A.19

Stepwise Regression of Residual Scores on Teaching Performance Variables (Step 6); (Step 6); Grade 2 Mathematics (N = 41).

GRADE 2 MATH U

THE DEPENDENT VARIABLE IS TOTMATHS. THE MULTIPLE CORRELATION IS 0.6748. THE STANDARD ERROR OF ESTIMATE= 0.0668

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		40.			
UNDER NULL HYPOTHESIS	0.2700	1.0000	39.			
DUE TO HYPOTHESIS	0.1229	0.4553	6.	0.0205	4.5980	0.0017
ERROR	0.1471	0.5447	33.	0.0045		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 33.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOTMATHF		0.8182	0.0678	12.0666		0.0307
INDEPENDENT VARIABLES						
WD-4	-0.5814	-0.3036	0.0764	-3.9760	-0.2609	0.2281
APPLE-7	-0.2712	-0.1411	0.0718	-1.9645	-0.0637	0.1336
APPLE-10	-0.2090	-0.1087	0.0739	-1.4717	-0.0357	0.1818
APPLE-12	-0.3832	-0.1991	0.0763	-2.6099	-0.1124	0.2343
WD-2	0.3442	0.1795	0.0841	2.1341	-0.0752	0.3656
APPLE-11	-0.1883	-0.0979	0.0749	-1.3069	-0.0282	0.2047
OTHER VARIABLES				NOW 32.D.F.		
RAMOS-2	0.0240	0.0131	0.0740	0.1767	0.0005	0.0806
RAMOS-3	0.0166	0.0088	0.0745	0.1175	0.0002	0.1427
RAMOS-4	-0.0380	-0.0198	0.0738	-0.2689	0.0012	0.1483
APPLE-1	-0.0768	-0.0399	0.0754	-0.5295	0.0047	0.1977
APPLE-2	-0.1274	-0.0670	0.0703	-0.9471	0.0149	0.0845
APPLE-3	0.0913	0.0489	0.0817	0.5968	0.0060	0.2812
APPLE-5	-0.1195	-0.0638	0.0846	-0.7539	0.0095	0.3340
APPLE-6	-0.1926	-0.1001	0.0913	-1.0967	0.0197	0.4680
WD-5	0.0368	0.0193	0.0748	0.2583	0.0011	0.1636
APPLE-8	-0.0998	-0.0518	0.0703	-0.7374	0.0091	0.0954
APPLE-9	-0.0626	-0.0336	0.0981	-0.3429	0.0020	0.4910
WD-3	-0.0071	-0.0037	0.0711	-0.0520	0.0000	0.0910
RAMOS-1	0.0298	0.0160	0.0728	0.2203	0.0008	0.0696
WD-1	-0.0962	-0.0509	0.0819	-0.6215	0.0065	0.2977
APPLE-13	0.0045	0.0023	0.0698	0.0336	0.0000	0.0499
APPLE-14	-0.0682	-0.0365	0.0820	-0.4447	0.0033	0.2601

Table A.20

Stepwise Regression of Residual Scores on Teacher Performance Variables (Step 15)
Grade 2 Mathematics (N = 41)

GRADE 2 MATH U

THE DEPENDENT VARIABLE IS TOTMATHS. THE MULTIPLE CORRELATION IS 0.7810. THE STANDARD ERROR OF ESTIMATE= 0.0662

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		40.			
UNDER NULL HYPOTHESIS	0.2700	1.0000	39.			
DUE TO HYPOTHESIS	0.1647	0.6100	15.	0.0110	2.5029	0.0218
ERROR	0.1053	0.3900	24.	0.0044		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 24.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOTMATHF		0.8709	0.0802	10.8612		0.3176
INDEPENDENT VARIABLES						
WD-4	-0.8563	-0.4472	0.0995	-4.4953	-0.3283	0.5522
APPLE-7	-0.5644	-0.2937	0.1274	-2.3044	-0.0863	0.7292
APPLE-10	-0.2286	-0.1189	0.0856	-1.3892	-0.0314	0.4000
APPLE-12	-0.3333	-0.1732	0.0850	-2.0368	-0.0674	0.3930
WD-2	0.5937	0.3095	0.1055	2.9330	-0.1393	0.6034
APPLE-11	-0.3336	-0.1735	0.0880	-1.9709	-0.0631	0.4330
APPLE-6	-0.5941	-0.3087	0.1262	-2.4466	-0.0973	0.7244
APPLE-5	-0.1718	-0.0917	0.1038	-0.8838	-0.0127	0.5702
APPLE-3	0.3463	0.1849	0.0990	1.8680	-0.0567	0.5271
APPLE-13	0.3678	0.1916	0.0964	1.9884	-0.0642	0.5250
APPLE-9	-0.4401	-0.2366	0.1255	-1.8857	-0.0578	0.7018
RAMOS-4	-0.3821	-0.1995	0.1141	-1.7485	-0.0497	0.6597
APPLE-2	-0.2349	-0.1236	0.0905	-1.3664	-0.0303	0.4504
RAMOS-1	0.2305	0.1241	0.0998	1.2441	-0.0251	0.5267
WD-5	-0.1397	-0.0733	0.0812	-0.9030	-0.0133	0.3211
OTHER VARIABLES				NOW 23.D.F.		
APPLE-8	0.0115	0.0060	0.0893	0.0672	0.0001	0.4254
RAMOS-3	-0.1364	-0.0721	0.1297	-0.5561	0.0052	0.7218
WD-3	0.1824	0.0948	0.0817	1.1597	0.0215	0.3521
RAMOS-2	0.0518	0.0282	0.1022	0.2757	0.0013	0.5215
WD-1	0.0835	0.0442	0.0975	0.4529	0.0034	0.5053
APPLE-1	-0.0386	-0.0201	0.1138	-0.1764	0.0005	0.6463
APPLE-14	0.0421	0.0225	0.0888	0.2535	0.0011	0.3857

$R = .78$ and an $R^2 = .61$; from Step 15, the significance of F has been decreasing. Therefore, we will use the data in Table A.19.

As can be seen, four of these variables have significant regression weights. The four variables are WD-2, WD-4, AP-7 and AP-12. Of these, only one has a positive regression weight, WD-2. WD-2 measures the number of specific mathematical skills taught. Thus, higher scores are associated with teaching more skills.

Note the magnitude of the regression weights. A high score on WD-4 subtracts a relatively large number; that is the more of the instruction conducted by the teacher, the greater the likelihood of lower residual scores. Teaching more mathematical skills when the teacher is doing most or all of the instruction probably contributes to lower residual scores.

Consider AP-7. AP-7 is total class instruction. High scores on this variable subtracts from the prediction. AP-12 is a teacher response category weighted by instructing and feedback. Ordinarily we would consider these variables as desirable performances but in these data they are appearing in conjunction with AP-7.

What we seem to have here is a picture of how not to teach mathematics at the second grade. Teaching the class as a whole (AP-7) and being the sole instructor (WD-4) contribute negatively. Helpful and positive teacher responses (AP-12) also contribute negatively. An optimal pattern does not appear in these data, except teaching more skills (WD-2). Covering more mathematics is obviously helpful but there seems to be also a pattern of ineffective teaching appearing in the data.

Reading and Math - Mean Gain Scores

Tables A.21 and A.22 present the stepwise regression analyses for total reading mean gain scores. With two variables against the remainder of the set, significant results are not obtained. In successive steps adding variables did not increase the significance and decrease the mean square consistently.

Tables A.23 and A.24 present the stepwise regressions for total mathematics mean gain scores. R = .80 and the performance variables account for 64 percent of the variance in the mean gain scores at Step 15.

Four of the variables have positive and significant regression weights at Step 15: R-1, WD-2, WD-3 and AP-13. Three of these, WD-2, R-1 and WD-3 have substantial standardized regression weights. This pattern is one in which time spent in instruction and preparation for instruction (R-1), variety of specific skills taught (WD-2), and the quality of the teaching methodology (WD-3) contribute to higher scores. AP-13 is a social control, task-orienting performance variable and its effect is reflected in AP-3; a pupil behavior-task involvement variable whose regression weight approaches significance.

AP-7 (teacher-class), AP-6 (teacher-group) WD-4 (teacher instructing), WD-5 (diversity of materials), R-4 (variety of instructional modes), AP-9 (unsustained instructional behaviors), and AP-2 (inattentiveness) have significant negative regression weights. We have seen and discussed a pattern like this when analyzing the regression of mean gain scores on all of the variables.

The reader should note that AP-13 (social control) and AP-2 (inattentiveness) have opposite signs for their regression weights. As all teachers had some pupil inattentiveness, doing something about this attentiveness seems critical. AP-2 has a larger regression weight so,

Table A.21

Stepwise Regression of Mean Gain Scores on Teaching Performance Variables (Step 1)
Grade 2 Reading (N=40)

THE DEPENDENT VARIABLE IS TOTREAD , THE MULTIPLE CORRELATION IS 0.2671, THE STANDARD ERROR OF ESTIMATE= 0.1563

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		39.			
UNDER NULL HYPOTHESIS	1.0000	1.0000	39.			
DUE TO HYPOTHESIS	0.0714	0.0714	1.	0.0714	2.9198	0.0957
ERROR	0.9286	0.9286	38.	0.0244		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 38.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
INDEPENDENT VARIABLES						
AD-4	-0.2671	-0.2671	0.1563	-1.7087	-0.0714	0.0
OTHER VARIABLES				NOW 37.D.F.		
AD-2	0.1512	0.1512	0.1639	0.9221	0.0209	0.0870
AD-3	0.0922	0.0922	0.1578	0.5844	0.0085	0.0012
AD-1	-0.0268	-0.0268	0.1607	-0.1671	0.0007	0.0284
AD-5	0.0422	0.0422	0.1617	0.2610	0.0017	0.0416
RAMUS-1	-0.1290	-0.1290	0.1628	-0.7928	0.0155	0.0685
RAMUS-2	-0.1472	-0.1472	0.1583	-0.9300	0.0212	0.0208
RAMUS-3	0.1644	0.1644	0.1571	1.0460	0.0267	0.0128
RAMUS-4	0.0796	0.0796	0.1583	0.5029	0.0063	0.0053
APPLE-1	0.2043	0.2043	0.1553	1.3150	0.0415	0.0064
APPLE-2	-0.1894	-0.1894	0.1607	-1.1787	0.0336	0.0633
APPLE-3	-0.0555	-0.0555	0.1606	-0.3455	0.0030	0.0303
APPLE-5	-0.0158	-0.0158	0.1596	-0.0988	0.0002	0.0154
APPLE-6	0.1248	0.1248	0.1753	0.7120	0.0126	0.1939
APPLE-7	0.2522	0.2522	0.1671	1.5096	0.0539	0.1531
APPLE-8	-0.1224	-0.1224	0.1579	-0.7751	0.0148	0.0092
APPLE-9	-0.0308	-0.0308	0.1600	-0.1927	0.0009	0.0201
APPLE-10	-0.1033	-0.1033	0.1590	-0.6499	0.0105	0.0179
APPLE-11	0.0442	0.0442	0.1710	0.2583	0.0017	0.1429
APPLE-12	0.1182	0.1182	0.1704	0.6938	0.0119	0.1467
APPLE-13	0.0445	0.0445	0.1616	0.2753	0.0019	0.0404
APPLE-14	-0.0584	-0.0584	0.1582	-0.3694	0.0034	0.0004

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Table A.22

Stepwise Regression of Mean Gain Scores on Teaching Performance Variables (Step 2)
Grade 2 Reading (N=40)

CLASS AVG. ANALYSIS ON FSA DATA BASE - GRADE 2 READING V

THE DEPENDENT VARIABLE IS TOTREAD , THE MULTIPLE CORRELATION IS 0.3539, THE STANDARD ERROR OF ESTIMATE= 0.1538

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		39.			
UNDER NULL HYPOTHESIS	1.0000	1.0000	39.			
DUE TO HYPOTHESIS	0.1252	0.1252	2.	0.0626	2.6485	0.0841
ERROR	0.8748	0.8748	37.	0.0236		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 37.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
INDEPENDENT VARIABLES						
AD-4	-0.3658	-0.3658	0.1671	-2.1894	-0.1133	0.1531
APPLE-7	0.2522	0.2522	0.1671	1.5096	-0.0539	0.1531
OTHER VARIABLES				NOW 36.D.F.		
AD-3	0.0745	0.0745	0.1560	0.4774	0.0055	0.0074
AD-1	-0.0550	-0.0550	0.1590	-0.3462	0.0029	0.0416
AD-5	0.0371	0.0371	0.1591	0.2333	0.0013	0.0421
ARMOS-1	-0.0840	-0.0840	0.1643	-0.5113	0.0063	0.1063
ARMOS-2	-0.1687	-0.1687	0.1556	-1.0842	0.0277	0.0281
ARMOS-3	0.1225	0.1225	0.1588	0.7709	0.0142	0.0525
ARMOS-4	0.0081	0.0081	0.1644	0.0495	0.0001	0.1012
APPLE-1	0.1666	0.1666	0.1567	1.0628	0.0266	0.0411
APPLE-2	-0.1751	-0.1751	0.1587	-1.1031	0.0286	0.0669
APPLE-3	-0.0479	-0.0479	0.1582	-0.3029	0.0022	0.0313
APPLE-5	0.0377	0.0377	0.1609	0.2341	0.0013	0.0634
APPLE-6	0.1942	0.1942	0.1754	1.1071	0.0288	0.2361
AD-2	0.1327	0.1327	0.1622	0.8184	0.0160	0.0927
APPLE-8	-0.1707	-0.1707	0.1567	-1.0889	0.0279	0.0422
APPLE-9	-0.0340	-0.0340	0.1574	-0.2161	0.0011	0.0203
APPLE-10	-0.0851	-0.0851	0.1569	-0.5676	0.0078	0.0217
APPLE-11	-0.0089	-0.0089	0.1722	-0.0518	0.0001	0.1808
APPLE-12	0.0976	0.0976	0.1686	0.5788	0.0081	0.1529
APPLE-13	-0.1663	-0.1663	0.2009	-0.8277	0.0163	0.4090
APPLE-14	-0.0820	-0.0820	0.1561	-0.5255	0.0067	0.0100

Table A.23

Stepwise Regression of Mean Gain Scores on Teaching Performance Variables (Step 8)
Grade 2 Mathematics (N=41)

THE DEPENDENT VARIABLE IS TOTMATH , THE MULTIPLE CORRELATION IS 0.6436, THE STANDARD ERROR OF ESTIMATE= 0.1353

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		40.			
UNDER NULL HYPOTHESIS	1.0000	1.0000	40.			
DUE TO HYPOTHESIS	0.4142	0.4142	8.	0.0518	2.8284	0.0171
ERROR	0.5858	0.5858	32.	0.0183		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 32.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
INDEPENDENT VARIABLES						
RAMOS-2	-0.2263	-0.2263	0.1402	-1.6142	-0.0477	0.0683
APPLE-7	-0.2266	-0.2266	0.1866	-1.2145	-0.0270	0.4741
APPLE-2	-0.4095	-0.4095	0.1500	-2.7300	-0.1364	0.1862
APPLE-12	-0.2229	-0.2229	0.1639	-1.3602	-0.0339	0.3186
WD-4	-0.5003	-0.5003	0.1784	-2.8049	-0.1440	0.4245
APPLE-9	-0.3747	-0.3747	0.1930	-1.9416	-0.0690	0.5086
WD-2	0.2974	0.2974	0.1633	1.8208	-0.0607	0.3137
APPLE-6	-0.2387	-0.2387	0.1890	-1.2631	-0.0292	0.4873
OTHER VARIABLES				NOW 31.D.F.		
RAMOS-4	-0.2527	-0.2527	0.1690	-1.4955	0.0394	0.3828
APPLE-1	-0.0096	-0.0096	0.1864	-0.0514	0.0000	0.4564
WD-3	0.0828	0.0828	0.1437	0.5765	0.0062	0.0943
APPLE-3	-0.0593	-0.0593	0.1552	-0.3822	0.0027	0.2194
APPLE-5	-0.1316	-0.1316	0.1866	-0.7050	0.0092	0.4659
RAMOS-3	0.0517	0.0517	0.2205	0.2345	0.0010	0.6119
WD-1	-0.0278	-0.0278	0.1530	-0.1817	0.0006	0.1934
APPLE-8	-0.0840	-0.0840	0.1577	-0.5324	0.0053	0.2470
RAMOS-1	0.1508	0.1508	0.1905	0.7913	0.0116	0.4898
APPLE-10	-0.1050	-0.1050	0.1516	-0.6925	0.0089	0.1905
APPLE-11	-0.1308	-0.1308	0.1596	-0.8192	0.0124	0.2743
WD-5	-0.0254	-0.0254	0.1454	-0.1746	0.0006	0.1072
APPLE-13	0.1140	0.1140	0.1640	0.6951	0.0090	0.3083
APPLE-14	-0.0590	-0.0590	0.1690	-0.3490	0.0023	0.3407

Table A.24

Stepwise Regression of Mean Gain Scores on Teaching Performance Variables (Step 15)
Grade 2 Mathematics (N=41)

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THE DEPENDENT VARIABLE IS TOTMATH , THE MULTIPLE CORRELATION IS 0.7971, THE STANDARD ERROR OF ESTIMATE= 0.1208

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		40.			
UNDER NULL HYPOTHESIS	1.0000	1.0000	40.			
DUE TO HYPOTHESIS	0.6353	0.6353	15.	0.0424	2.9039	0.0090
ERROR	0.3647	0.3647	25.	0.0146		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 25.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
INDEPENDENT VARIABLES						
RAMOS-2	-0.2719	-0.2719	0.1742	-1.5608	-0.0355	0.5193
APPLE-7	-0.4151	-0.4151	0.2399	-1.7306	-0.0437	0.7465
APPLE-2	-0.5147	-0.5147	0.1588	-3.2411	-0.1532	0.4217
APPLE-12	-0.2232	-0.2232	0.1541	-1.4482	-0.0306	0.3859
WD-4	-0.8300	-0.8300	0.1841	-4.5039	-0.2965	0.5696
APPLE-9	-0.7274	-0.7274	0.2059	-3.5326	-0.1320	0.6560
WD-2	0.5496	0.5496	0.1674	3.2836	-0.1573	0.4793
APPLE-6	-0.7456	-0.7456	0.2380	-3.1320	-0.1431	0.7426
RAMOS-4	-0.7322	-0.7322	0.2159	-3.3911	-0.1677	0.6871
RAMOS-1	0.6158	0.6158	0.2160	2.8512	-0.1186	0.6873
WD-3	0.3240	0.3240	0.1490	2.1740	-0.0689	0.3432
WD-5	-0.2758	-0.2758	0.1460	-1.8884	-0.0520	0.3159
APPLE-13	0.3041	0.3041	0.1734	1.7532	-0.0448	0.5151
APPLE-3	0.2414	0.2414	0.1699	1.4208	-0.0294	0.4947
APPLE-5	-0.2308	-0.2308	0.1846	-1.2499	-0.0226	0.5722
OTHER VARIABLES				NOW 24.D.F.		
APPLE-8	0.0113	0.0113	0.1560	0.0754	0.0001	0.3755
APPLE-1	0.0761	0.0761	0.2212	0.3439	0.0018	0.6911
APPLE-10	-0.1019	-0.1019	0.1563	-0.6519	0.0063	0.3886
APPLE-11	-0.1815	-0.1815	0.1544	-1.1754	0.0198	0.3977
RAMOS-3	-0.2753	-0.2753	0.2788	-0.9877	0.0142	0.8121
WD-1	0.0813	0.0813	0.1523	0.5339	0.0043	0.3527
APPLE-14	0.0664	0.0664	0.1612	0.4119	0.0026	0.4191

considering only these two scores, the teacher has to have a high score on AP-13 to counterbalance the effect of the AP-2 score.

It may be that the teaching arrangement reflected in high scores on these variables is a source of inattentiveness. Again it is a reasonable inference that a pattern of high scores on these variables is an ineffective pattern of teaching performances.

Summary and Interpretation for Grade 2

A number of different kinds of analyses were presented in the preceding pages and some of these showed significant relations between teaching performances and achievement scores in reading and mathematics. In this section we will attempt to interpret these results. This interpretation is the first one. It is the one made from analyses in which a conventional strategy was used.

In the preceding section we used the entire sample of teachers' classes where for Reading, N = 40 and for Mathematics, N = 41. In each class the scores of the students are those of students taught by the teacher. Only students have been included who had scores for both fall and spring.

But in this sample some class sizes are small because some teachers had classes that contained students who were not tested. These untested students were students of another teacher not participating in the study who had been moved into the participating teacher's class for reading or mathematics.

In other cases there was turnover in the original class. We have explained in Chapter 6 how these rearrangements and other factors affected the number of students used in the analysis.

There are seven classes in the sample on which we have been reporting the results of the analyses where the class size was less than ten. The question of interest here is, how will these small class sizes affect the magnitude of $\underline{r}$ and R?

As N decreases in size, σ_f and σ_s increase in size. In general the scores of smaller classes will have larger variances, and the scores of the set of 40 classes will have a larger variance than the set of 33 classes.

But

$$r = \frac{cov}{\sigma_f \sigma_s}$$

As σ_f and σ_s increase in size, the value of $\underline{r}$ decreases. Therefore, by using this sample we run the risk of obtaining fewer significant $\underline{r}$'s. But significant $\underline{r}$'s are more noteworthy. Therefore, we take seriously the significant $\underline{r}$'s and recognize that we may have missed some $\underline{r}$'s that would have been significant had the sample not included classes with small N's.

In a subsequent section of this chapter, we will look at the analysis for the 33 classes. A comparison of the two major analyses will produce evidence of $\underline{r}$'s that appeared significant in both samples (which the reader should remember are not independent).

We have also used two different kinds of scores, residual scores and mean gain scores. A residual scores analysis tells us how much of the variance in spring scores may be accounted for by the variance in the scores of a performance variable after the portion accounted for by the fall score

has been "removed". The mean gain score analysis tells us what performance variables relate to the change in scores over the year.

Table A.25 summarizes the results by subject and by type of analysis. Column A, for example, shows that when for Reading the scores were regressed against the performance variables as a group, the regression coefficient was not significant in either analysis. But in Mathematics a significant relation was found, and those variables which had significant regression weights are listed. Only variables having significant weights have been included. In the single variable analysis we have included R's for which $p \leq .10$.

Reading

One way to capture the trends in the data is to list the number of times a variable appears in an analysis. In the list below positive and negative predictors are grouped separately.

Number of Times Positive and Significant	
1	2
AP-6	R-3
AP-12	

Number of Times Negative and Significant		
1	2	3
R-2		WD-4

Consider the positives. R-3 is diversity of instructional material. Its positive weight appears in the two stepwise regressions. The use of a diversity of materials seems related to higher residual scores.

Table A.25

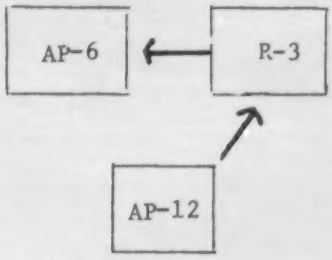
Summary of Significant Grade 2 Teacher Performance Variables Listed by Type of Analysis

(Total Group: $N_R = 40$; $N_M = 41$)

	Multiple Regression				Stepwise Regression	
	A. All Variables		B. Single Variables		C.	
	Residual Scores	Mean Gains	Residual Scores	Mean Gains	Residual Scores	Mean Gains
Reading	n.s.*	n.s.	R-3 (+) AP-6 (+) AP-12(+)		R-3 (+)	n.s.
			WD-4 (-)	WD-4 (-)	WD-4 (-) R-2 (-)	
Mathematics	n.s.	WD-2 (+) WD-3 (+) R-1 (+) AP-3 (+) AP-13(+)			WD-2 (+)	WD-2 (+) WD-3 (+) R-1 (+) AP-13(+)
		WD-4 (-) WD-5 (-)	WD-4 (-)		WD-4 (-)	WD-4 (-) WD-5 (-)
				R-2 (-) R-3 (-)		
		R-4 (-) AP-2 (-) AP-6 (-)				R-4 (-) AP-2 (-) AP-6 (-)
			AP-7 (-)	AP-7(-)	AP-7 (-)	AP-7 (-)
		AP-9 (-) AP-11(-)				AP-9 (-)
					AP-12(-)	

*non-significant

It does not seem likely that this variable alone will account for differences in these scores. Therefore let us also consider AP-6 (teacher-group) and AP-12 (responsiveness to individual pupils). We can then see a model:



The teacher groups the class (AP-6) (probably by level of achievement), instructs the group, provides a variety of materials (R-3) (probably appropriate to the level), and works individually to instruct and provide feedback (AP-12). You have here a picture of a teacher who works frequently with the groups and frequently with pupils individually.

Using the correlation matrix from the stepwise regression, we find the following r's:

	r	
	R-3	AP-6
R-3	-	
AP-6	.18	-
AP-12	.25	-.08

Only one of these r's is significant ($r = .25$). This positive correlation should be expected; the more diversive the materials, the more attention pupils will need individually. The non-significant r between AP-6 and AP-12 should not be surprising since when the teacher is working with the

group, she may or may not be responding to individual children in the group. The positive but non-significant r between AP-6 and R-3 is in the expected direction, but some teachers apparently group but do not diversify the instructional pattern.

Consider the negative predictors: WD-4 and R-2. A high score on WD-4 means the teacher is doing more of the instructing and R-2 is a diversity of instructional purposes -- introducing new material, practicing, and reviewing. This combination suggests that trying to do many things by the teacher alone is an ineffective combination. One suspects that without an organizational structure in which the teacher teaches in groups and in the absence of working with individual students, the teacher is likely to be less effective.

It should be remembered that a high score for AP-6 means that the teacher was actually spending more time teaching in groups. The observers had recorded the time in this context. The actual scores used in this analysis were pro-rated frequencies across all events so the "power" of this variable may even be underestimated in this analysis.

Mathematics

Obviously many more variables showed up as significant in mathematics than in reading. Their frequency of occurrence in the analyses is listed below:

Number of Time Positive and Significant

1	2	3
AP-3	WD-3	WD-2
	R-1	
	AP-13	

Number of Times Negative and Significant

1	2	3	4
R-2	WD-5		WD-4
R-3	R-4		AP-7
AP-11	AP-2		
AP-12	AP-6		
	AP-9		

Consider first the positives. WD-2 is the variety of skills taught. WD-3 is a measure of the quality of the teaching methodology. Higher scores mean that teachers have taught skills and concepts, can link them to an instructional activity and a teaching strategy. R-1 is time spent on teaching and preparing to teach mathematics (weighted more heavily by the teaching component). AP-13 is a set of teacher responses directed to social control to maintain task-involvement (weighted more heavily by redirecting). AP-3 is a pupil behavior, attentiveness.

Teachers with high scores on these variables are teachers who maintain more task-involvement (AP-13—AP-3) spend more time teaching mathematics (R-1), cover more aspects of mathematics (WD-2), and conceptualize a more sophisticated methodology for teaching (WD-3).

Consider the negative predictors. AP-7 (teacher-class) and AP-6 (teacher-group) are context variables. R-4 is a variety of instructional activities. AP-9 is periodic questioning and answering, and checking. WD-5 is a greater variety of materials. R-3 is also a greater variety of materials. Ordinarily we think that these are variables which ought to have positive effects.

But notice that WD-4 is a negative predictor. High scores mean more

of the instruction is done by the teacher. One suspects that some teachers who have high scores on these variables may not know how to manage this much diversity. This speculation is supported by the fact that AP-2 (inattentiveness) is a negative predictor. The combination of AP-7 (simultaneous instruction), AP-11 (at desk, at board), and AP-12 (questioning and feedback responses) inversely relates to outcomes.

Thus a pattern of high scores on these variables and a low score on AP-13 sets the conditions for less learning. If a teacher also has low scores on R-1 (time spent) and WD-2 ("breadth" of content), the conditions exist for less learning.

Significant Domains of Performance

Earlier in this chapter we categorized the variables by domains. These domains are listed in Tables A.26 and A.27. The variables found to be significant predictors, positive or negative, are listed by domain. The number in the parenthesis indicates the number of times the variable appeared significantly through the different analyses.

Three domains appear relevant in Reading: instructional material, instructional organization, and teacher-pupil interaction. The absence of predictors in instructional time, instructional activity, and pupil behavior may seem surprising. The absence of a predictor variable, however, may be misleading. AP-3 (attentiveness), a pupil behavior, is positively correlated with AP-6, $r = .64$. There are also no correlations of the variables in instructional time with positive predictors.

The configuration for Mathematics is quite different. Predictors appear in all categories, but in instructional time only positive predictors appear,

Table A.26

Summary of Significant Teacher Performance Variables Listed by Categories: Reading Grade 2

Category	Significant (+)	Significant (-)	Non-Significant
Instructional Time			X
Instructional Content		R-2(one)	
Instructional Material	R-3(two)*		
Instructional Organization	AP-6(one)	WD-4(three)	
Instructional Activity			X
Teacher-Pupil Interaction	AP-12(one)		
Pupil Behavior			X

* Parenthetical expression is the number of times a performance variable was significant.

Table A.27

Summary of Significant Teacher Performance Variables Listed by Categories: Mathematics Grade 2

Category	Significant		Non-Significant
	(+)	(-)	
Instructional Time	R-1(two)*		
Instructional Content	WD-2(three) WD-3(two)	R-2(one)	
Instructional Material		WD-5(two) R-3(one)	
Instructional Organization		WD-4(four) AP-6(two) AP-7(four)	
Instructional Activity		R-4(two) AP-9(two) AP-11(one)	
Teacher-Pupil Interaction	AP-13(two)	AP-12(one)	
Pupil Behavior	AP-3(one)	AP-2(two)	

* Parenthetical expression is the number of times a performance variable was significant.

and in instructional materials, instructional organization and instructional activities only negative predictors appear. This pattern of negative predictors has been discussed previously.

The reader should not make too much of the absence of predictors in these domains. The analyses from which these tables were derived used the sample of all classes and by using this sample, we are increasing the likelihood of missing a relation.

Variables Common Across Subjects

No variables appear as positive predictors in both Reading and Mathematics. This lack of overlap suggests that different performances are effective in teaching these two subjects.

The variables which appear as negative predictors in both Reading and Mathematics are R-2 and WD-4. This is the pattern of the teacher carrying the major or sole responsibility for instruction and trying to achieve many goals. Time spent on the goals of practice of facts and skills largely determines high R-2 scores. This pattern by itself probably is an index of less effective teaching.

Regression Analysis - Grade 5

In the following sections we present the same kind of analysis for Grade 5 that we presented for Grade 2. Recall that there are two kinds of scores used in these analyses--residual scores and mean gain scores. The analyses for residual scores are presented first, then those for mean gain scores.

Within a score category, the first analysis is the multiple regression of that type of score against the performance variable; then the regressions

in which performance variables are grouped by instrument followed by each variable separately. Finally the stepwise regressions are presented.

Reading: Multiple Regression - Residual Scores

Table A.28 presents the results of regressing spring scores, with fall scores partialled out, against all the variables. R = .67 but is not significant. Note again the size of the fall score's regression weight.

When the performance variables were grouped by instrument, only the group AP-8 to AP-11 yielded a significant R = .39 (see Table A.29). In this set AP-8 and AP-10 have significant regression weights.

Table A.30 presents the regressions analyses for each variable separately. WD-1, R-3 and AP-8 are significant ($p < .10$). Each of these variables accounts for a very small portion of the variance in spring scores when fall scores are partialled out.

These analyses produced little of significance. But the meaning of the analyses should be considered before concluding that there is no relation between teaching performances and student learning. Consider the group of teaching performances as a whole. They include a wide range of teaching performances most of which are believed to be effective. When scores on these measures are used in the analysis, we are asking if this collection as a collection is related to differences in residual scores. As a group they are not; nor are subgroups of them (with one exception) related significantly to the differences in pupil achievement.

If the teaching performance variables are considered one at a time, the results are again meager (three r's for which $p \leq .10$). Two of these relations account separately for about eight percent of the variance in the residual scores. One can consider, however, that since the fall

Table A.28

Multiple Regression of Residual Scores on Teaching Performance Variables;
Grade 5 Reading (N = 53)

GRADE 5 READING

THE DEPENDENT VARIABLE IS TOTREADS. THE MULTIPLE CORRELATION IS 0.6662. THE STANDARD ERROR OF ESTIMATE= 0.0479

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		52.			
UNDER NULL HYPOTHESIS	0.1195	1.0000	51.			
DUE TO HYPOTHESIS	0.0530	0.4439	22.	0.0024	1.0522	0.4426
ERROR	0.0664	0.5561	29.	0.0023		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 29.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOTREADF		0.9531	0.0648	14.7008		0.4550
INDEPENDENT VARIABLES						
WD-1	-0.1199	-0.0415	0.0691	-0.6009	-0.0069	0.5183
WD-2	0.2428	0.0845	0.0747	1.1307	-0.0245	0.5842
WD-3	-0.1231	-0.0443	0.0631	-0.7019	-0.0094	0.3762
WD-4	-0.0055	-0.0019	0.0617	-0.0311	-0.0000	0.3986
WD-5	-0.3217	-0.1125	0.0781	-1.4412	-0.0398	0.6152
RAMOS-1	0.3120	0.1096	0.0855	1.2817	-0.0315	0.6765
RAMOS-2	-0.2725	-0.0943	0.0831	-1.1348	-0.0247	0.6673
RAMOS-3	-0.3362	-0.1173	0.0908	-1.2917	-0.0320	0.7169
RAMOS-4	0.2783	0.0962	0.0753	1.2779	-0.0313	0.5957
APPLE-1	-0.1710	-0.0607	0.0731	-0.8305	-0.0132	0.5477
APPLE-2	-0.4689	-0.1622	0.0888	-1.8267	-0.0640	0.7089
APPLE-3	-0.3191	-0.1113	0.0868	-1.2819	-0.0315	0.6905
APPLE-5	0.0331	0.0115	0.0856	0.1341	-0.0003	0.6858
APPLE-6	0.4396	0.1629	0.1131	1.4403	-0.0398	0.7942
APPLE-7	0.1035	0.0374	0.0920	0.4060	-0.0032	0.7051
APPLE-8	-0.1623	-0.0562	0.0669	-0.8395	-0.0135	0.4871
APPLE-9	0.1258	0.0438	0.0642	0.6821	-0.0089	0.4360
APPLE-10	0.3702	0.1286	0.0660	1.9487	-0.0728	0.4691
APPLE-11	0.3072	0.1065	0.0678	1.5691	-0.0472	0.4997
APPLE-12	-0.0769	-0.0268	0.0728	-0.3579	-0.0026	0.5616
APPLE-13	-0.0231	-0.0080	0.0552	-0.1223	-0.0003	0.4617
APPLE-14	0.0563	0.0195	0.0635	0.3077	-0.0018	0.4271

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Table A.29

Multiple Regression of Residual Scores on a Subset of Teaching Performance Variables, Ap-8 to Ap-11
Grade 5 Reading (N = 53).

GRADE 5 READING

THE DEPENDENT VARIABLE IS TOTREADS. THE MULTIPLE CORRELATION IS 0.3936. THE STANDARD ERROR OF ESTIMATE= 0.0463

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		52.			
UNDER NULL HYPOTHESIS	0.1195	1.0000	51.			
DUE TO HYPOTHESIS	0.0185	0.1549	4.	0.0046	2.1541	0.0888
ERROR	0.1010	0.8451	47.	0.0021		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 47.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOTREADF		0.9301	0.0471	19.7309		0.0332
INDEPENDENT VARIABLES						
APPLE-8	-0.2452	-0.0848	0.0475	-1.7869	-0.0574	0.0450
APPLE-9	0.1574	0.0548	0.0485	1.1293	-0.0229	0.0747
APPLE-10	0.2582	0.0897	0.0501	1.7907	-0.0577	0.1354
APPLE-11	0.0959	0.0332	0.0511	0.6510	-0.0076	0.1717

1330

Table A.30

Regression Parameters for Teaching Performance Variables
Grade 5 Reading - Residual Scores

Performance Variable	|R|	$\sigma_{y.x}$	df	p	Prop. of SQ.
WD-1	.24 (-.24)*	.05	52	.09	.001
WD-2	.04	.05	52	.79	.001
WD-3	.09	.05	52	.51	.01
WD-4	.07	.05	52	.62	.004
WD-5	.15	.05	52	.27	.02
RA-1	.10	.05	52	.47	.01
RA-2	.20	.05	52	.16	.04
RA-3	.24 (-.24)	.05	52	.08	.06
RA-4	.04	.05	52	.79	.001
AP-1	.002	.05	52	.99	.00
AP-2	.23	.05	52	.11	.05
AP-3	.07	.05	52	.64	.004
AP-5	.12	.05	52	.41	.01
AP-6	.02	.05	52	.87	.00
AP-7	.08	.05	52	.59	.01
AP-8	.28 (-.28)	.05	52	.04	.08
AP-9	.18	.05	52	.19	.03
AP-10	.22	.05	52	.11	.05
AP-11	.01	.05	52	.95	.00
AP-12	.06	.05	52	.68	.003
AP-13	.17	.05	52	.22	.003
AP-14	.09	.05	52	.54	.007

*Note that the column values are the absolute values of R. The sign of R is given for significant R's.

scores account for such a large percentage of the variance, even an additional eight percent is meaningful.

But in all of these analyses we have not considered the variables in relation to each other. Stepwise regressions were performed on the data to obtain the best prediction when the predictive power of the variables in relation to each other was considered.

Reading: Stepwise Regressions - Residual Scores

Tables A.31 and A.32 present the stepwise regressions with different numbers of variables entered - two variables in A.31; seven variables in A.32. Beyond this level the significance of F begins to decrease. Note the drop in the value of the mean square, and that the regression weight for the fall score is large, .9111. At this level (Step 7) the performance variables account for 31 percent of the variance and r is .56.

Consider the data in Table A.32. Two variables have significant and positive regression weights, AP-10 (teaching activities such as discussing, explaining, and question and answering) and R-4 (variety of instructional activities).

Three variables have significant and negative regression weights: WD-5 (diversity of materials), R-3 (variety of instructional materials) and AP-2 (inattentiveness).

The pattern of performance that predicts higher residual scores is one characterized by higher scores on AP-10 and R-4 and lower scores on AP-2, R-3 and WD-5. AP-10 and R-4 are teaching activities; the AP-10 score is about equally influenced by its components - discussing, explaining, listening, questioning and answering - so that what was

Table A.31

Stepwise Regression of Residual Scores on Teaching Performances (Step 2);
Grade 5 Reading (N = 53)

GRADE 5 READING

THE DEPENDENT VARIABLE IS TOTREADS. THE MULTIPLE CORRELATION IS 0.3588. THE STANDARD ERROR OF ESTIMATE= 0.0461

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		52.			
UNDER NULL HYPOTHESIS	0.1195	1.0000	51.			
DUE TO HYPOTHESIS	0.0154	0.1287	2.	0.0077	3.6203	0.0342
ERROR	0.1041	0.8713	49.	0.0021		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 49.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOTREADF		0.9270	0.0463	20.0009		0.0109
INDEPENDENT VARIABLES						
APPLE-8	-0.2803	-0.0970	0.0461	-2.1021	-0.0786	0.0000
APPLE-10	0.2237	0.0777	0.0463	1.6772	-0.0500	0.0000
OTHER VARIABLES				NOW 48.D.F.		
WD-3	-0.0913	-0.0329	0.0495	-0.6645	0.0079	0.0469
WD-4	0.0719	0.0249	0.0465	0.5341	0.0051	0.0048
WD-5	-0.1858	-0.0650	0.0467	-1.3908	0.0337	0.0221
RAMOS-1	-0.0748	-0.0262	0.0489	-0.5365	0.0052	0.0707
RAMOS-2	-0.1811	-0.0627	0.0475	-1.3210	0.0306	0.0686
RAMOS-3	-0.1931	-0.0674	0.0488	-1.3815	0.0333	0.1069
RAMOS-4	0.0735	0.0254	0.0494	0.5143	0.0048	0.1156
APPLE-1	0.0025	0.0009	0.0483	0.0182	0.0000	0.0196
APPLE-2	-0.1711	-0.0592	0.0465	-1.2725	0.0284	0.0236
APPLE-3	0.0099	0.0035	0.0484	0.0717	0.0001	0.0555
APPLE-5	-0.0675	-0.0234	0.0480	-0.4873	0.0043	0.0575
APPLE-6	0.0255	0.0094	0.0508	0.1858	0.0006	0.0340
APPLE-7	-0.0001	-0.0000	0.0554	-0.0004	0.0000	0.2303
WD-1	-0.1654	-0.0573	0.0472	-1.2130	0.0259	0.0529
APPLE-9	0.1386	0.0482	0.0472	1.0223	0.0186	0.0329
WD-2	0.0166	0.0058	0.0469	0.1230	0.0003	0.0034
APPLE-11	0.0613	0.0212	0.0501	0.4242	0.0033	0.1343
APPLE-12	-0.0796	-0.0277	0.0475	-0.5834	0.0061	0.0318
APPLE-13	-0.1766	-0.0610	0.0458	-1.3334	0.0311	0.0018
APPLE-14	-0.0587	-0.0204	0.0478	-0.4269	0.0033	0.0448

Table A.32

Stepwise Regression of Residual Scores on Teaching Performances (Step 7);
Grade 5 Reading (N = 53)

GRADE 5 READING

THE DEPENDENT VARIABLE IS TOTREADS. THE MULTIPLE CORRELATION IS 0.5571. THE STANDARD ERROR OF ESTIMATE= 0.0433

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		52.			
UNDER NULL HYPOTHESIS	0.1195	1.0000	51.			
DUE TO HYPOTHESIS	0.0371	0.3103	7.	0.0053	2.8283	0.0160
ERROR	0.0824	0.6897	44.	0.0019		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 44.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOTREADF		0.9111	0.0450	20.2433		0.0754
INDEPENDENT VARIABLES						
APPLE-8	-0.2075	-0.0718	0.0479	-1.4997	-0.0353	0.1810
APPLE-10	0.3559	0.1236	0.0485	2.5481	-0.1018	0.1965
WD-5	-0.2409	-0.0843	0.0466	-1.8097	-0.0513	0.1155
APPLE-2	-0.2919	-0.1010	0.0465	-2.1717	-0.0739	0.1325
RAMOS-5	-0.3397	-0.1185	0.0534	-2.2182	-0.0771	0.3317
RAMOS-4	0.2948	0.1019	0.0535	1.9039	-0.0568	0.3461
APPLE-11	0.2175	0.0754	0.0501	1.5044	-0.0355	0.2498
OTHER VARIABLES				NOW 43.D.F.		
WD-3	-0.0538	-0.0194	0.0477	-0.4062	0.0026	0.0906
RAMOS-1	0.2113	0.0742	0.0618	1.2007	0.0224	0.4990
APPLE-1	-0.0459	-0.0163	0.0496	-0.3285	0.0017	0.1801
WD-4	0.0158	0.0055	0.0454	0.1203	0.0002	0.0701
APPLE-3	-0.0594	-0.0207	0.0555	-0.3732	0.0022	0.3687
APPLE-5	-0.0674	-0.0233	0.0584	-0.3996	0.0026	0.4381
APPLE-6	0.0542	0.0201	0.0522	0.3776	0.0023	0.2245
APPLE-7	-0.0058	-0.0021	0.0530	-0.0395	0.0000	0.2564
WD-1	-0.0773	-0.0268	0.0495	-0.5411	0.0047	0.2195
APPLE-9	0.0934	0.0325	0.0468	0.6947	0.0077	0.1219
WD-2	0.0156	0.0054	0.0447	0.1215	0.0002	0.0288
RAMOS-2	-0.2174	-0.0752	0.0622	-1.2093	0.0227	0.5200
APPLE-12	-0.1389	-0.0484	0.0487	-0.9919	0.0154	0.2003
APPLE-13	-0.1099	-0.0380	0.0453	-0.8381	0.0111	0.0816
APPLE-14	-0.0229	-0.0080	0.0469	-0.1695	0.0005	0.1222

observed was a variety of these activities. R-4 is weighted by independent seatwork and includes a range of teaching activities like those in AP-10. Thus, these two variables together represent a pattern of interactive teaching activities and independent seatwork. $r = -.04$ for AP-10 and R-4 which indicates that the two kinds of activities are independent. The standardized regression weights are: AP-10, .3599; R-4, 2948. One suspects that some combination of AP-10 and R-4 is an optimal instructional strategy.

AP-2 (inattentiveness) is negatively related to the outcome measure. WD-5 (variety of material) and R-3 (diversity of materials used) are alike and also are negative predictors. Obviously a greater proportion of inattentiveness is not likely to contribute to learning, and diversity of materials in itself need not help, and may inhibit, learning.

Consider the following speculation. We know that R-4 (which is mainly independent seatwork here) is a positive predictor. There may be two patterns of performance embedded in these data. Consider the case of a teacher who uses more independent seatwork. If he or she also uses a diversity of materials, and is also doing more interacting with students, the students are able to cope with the materials because they are getting help with it.

The opposite case is that of a teacher who uses independent seatwork but does not interact with the students to instruct them. In this case the diversity may interfere because the students have less direct instruction.

A similar speculation may be made for R-4, independent seatwork, and diversity of materials (WD-5 and R-3). More independent seatwork (R-4) and more instruction (AP-10) add to the prediction. In this pattern

more diversity does not add to the prediction. But if the pattern is more independent seatwork (R-4) but less instructing (AP-10) then more diversity (WD-5 and R-3) subtracts from the prediction. Thus, the critical component is probably interactive instruction, AP-10.

Mathematics: Multiple Regressions - Residual Scores

The multiple regression of residual scores on all teaching performance variables is presented in Table A.33. $R = .77$ is significant ($p = .04$), and $R^2 = .59$. Obviously teaching performance variables are accounting for a significant portion of the variance in residual scores. Except for WD-4, all the variables having significant regression weights are in the APPLE categories, AP-2, AP-3, AP-7, AP-10 and AP-13. Table A.34 presents the regression of these scores against the APPLE variables. $R = .62$ ($p = .05$) and $R^2 = .39$. AP-1, AP-2 and AP-7 have significant regression weights.

When the APPLE variables are grouped by pupil behavior (1-3), context (5-7); teaching activity (8-11) and teacher response (12-14) and residual scores are regressed against them, two categories have significant R's, pupil behavior and context. These results are presented in Table A.35. AP-2 and AP-7 have significant regression weights.

As is apparent in these analyses there are a number of variables showing up as significantly related to residual scores. Table A.36 presents the results of the regression of residual scores against each variable separately. AP-2, AP-5 and WD-4 are significant; AP-7 is at the .10 level of significance. AP-2 accounts for 18 percent of the variance; and AP-5, eight percent.

The variables found significant in these analyses are listed below by analysis.

Table A.33

Multiple Regression of Residual Scores for Mathematics on Teaching Performance Variables;
Grade 5 (N = 54)

GRADE 5 MATH

THE DEPENDENT VARIABLE IS TOTMATHS. THE MULTIPLE CORRELATION IS 0.7711. THE STANDARD ERROR OF ESTIMATE= 0.0450

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		53.			
UNDER NULL HYPOTHESIS	0.1496	1.0000	52.			
DUE TO HYPOTHESIS	0.0890	0.5945	22.	0.0040	1.9994	0.0390
ERROR	0.0607	0.4055	30.	0.0020		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 30.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOTMATHF		1.0060	0.0673	14.9511		0.5532
INDEPENDENT VARIABLES						
AL-1	-0.0595	-0.0230	0.0634	-0.3627	-0.0018	0.4671
AL-2	0.0996	0.0385	0.1044	0.3691	-0.0018	0.8142
AL-3	-0.0444	-0.0176	0.0632	-0.2786	-0.0010	0.4680
AL-4	0.3368	0.1328	0.0796	1.6695	-0.0377	0.6679
AL-5	-0.2571	-0.1016	0.0650	-1.5637	-0.0330	0.5000
RAGS-1	-0.1305	-0.0535	0.0876	-0.6104	-0.0050	0.7295
RAGS-2	0.1653	0.0711	0.1082	0.6575	-0.0058	0.8261
RAGS-3	0.0613	0.0291	0.1028	0.2341	-0.0007	0.8832
RAGS-4	-0.2548	-0.0986	0.1095	-0.9007	-0.0110	0.8312
APPLE-1	-0.1667	-0.0731	0.0739	-0.9882	-0.0132	0.6294
APPLE-2	-0.4727	-0.1878	0.0775	-2.4250	-0.0795	0.6443
APPLE-3	-0.3249	-0.1257	0.0717	-1.7520	-0.0415	0.6071
APPLE-5	-0.0291	-0.0113	0.0703	-0.1605	-0.0003	0.5889
APPLE-6	0.2606	0.1052	0.0760	1.4372	-0.0279	0.6455
APPLE-7	0.4456	0.1726	0.0669	2.5803	-0.0900	0.5469
APPLE-8	0.2129	0.0824	0.0613	1.3434	-0.0244	0.4620
APPLE-9	-0.0387	-0.0152	0.0804	-0.1895	-0.0005	0.6760
APPLE-10	0.3686	0.1440	0.0696	2.0683	-0.0578	0.5749
APPLE-11	0.1132	0.0439	0.0612	0.7501	-0.0076	0.4555
APPLE-12	0.0787	0.0304	0.0789	0.3857	-0.0020	0.6752
APPLE-13	0.3534	0.1368	0.0563	2.4308	-0.0799	0.3606
APPLE-14	-0.2283	-0.0902	0.0813	-1.1095	-0.0166	0.6806

Table A.34

Multiple Regression of Residual Scores for Mathematics Against APPLE Variables;
Grade 5 (N = 54)

GRADE 5 MATH

THE DEPENDENT VARIABLE IS TOTMATHS. THE MULTIPLE CORRELATION IS 0.6291. THE STANDARD ERROR OF ESTIMATE= 0.0482

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		53.			
UNDER NULL HYPOTHESIS	0.1496	1.0000	52.			
DUE TO HYPOTHESIS	0.0592	0.3957	13.	0.0046	1.9645	0.0520
ERROR	0.0904	0.6043	39.	0.0023		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 39.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOTMATHF		0.9741	0.0535	18.1947		0.1910
INDEPENDENT VARIABLES						
APPLE-1	-0.2579	-0.0998	0.0577	-1.7295	-0.0463	0.3031
APPLE-2	-0.5401	-0.2146	0.0716	-2.9966	-0.1391	0.5230
APPLE-3	-0.2326	-0.0900	0.0711	-1.2657	-0.0248	0.5412
APPLE-5	0.0123	0.0048	0.0663	0.0721	-0.0001	0.4700
APPLE-6	0.1792	0.0698	0.0748	0.9322	-0.0135	0.5606
APPLE-7	0.2874	0.1113	0.0675	1.6479	-0.0421	0.4505
APPLE-8	0.1355	0.0524	0.0614	0.8537	-0.0113	0.3347
APPLE-9	-0.0414	-0.0163	0.0647	-0.2515	-0.0010	0.4269
APPLE-10	0.2323	0.0907	0.0612	1.4819	-0.0340	0.3695
APPLE-11	0.1499	0.0582	0.0564	1.0320	-0.0165	0.2661
APPLE-12	0.1065	0.0412	0.0672	0.6137	-0.0058	0.4858
APPLE-13	0.2100	0.0813	0.0519	1.5667	-0.0380	0.1380
APPLE-14	-0.0961	-0.0380	0.0655	-0.5465	-0.0046	0.4589

Table A.35

Multiple Regression of Residual Scores for Mathematics Against
Both Pupil Behavior and Teaching Context Categories;
Grade 5 (N = 54)

GRADE 5 MATH

THE DEPENDENT VARIABLE IS TOTMATHS. THE MULTIPLE CORRELATION IS 0.4555. THE STANDARD ERROR OF ESTIMATE= 0.0492

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		53.			
UNDER NULL HYPOTHESIS	0.1496	1.0000	52.			
DUE TO HYPOTHESIS	0.0310	0.2075	3.	0.0103	4.2755	0.0093
ERROR	0.1186	0.7925	49.	0.0024		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 49.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOTMATHF		0.9643	0.0508	18.9695		0.0633
INDEPENDENT VARIABLES						
APPLE-1	-0.1514	-0.0586	0.0506	-1.1592	-0.0217	0.0520
APPLE-2	-0.4369	-0.1736	0.0536	-3.2399	-0.1698	0.1104
APPLE-3	0.0812	0.0314	0.0512	0.6137	-0.0061	0.0759

GRADE 5 MATH

THE DEPENDENT VARIABLE IS TOTMATHS. THE MULTIPLE CORRELATION IS 0.3835. THE STANDARD ERROR OF ESTIMATE= 0.0510

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		53.			
UNDER NULL HYPOTHESIS	0.1496	1.0000	52.			
DUE TO HYPOTHESIS	0.0220	0.1471	3.	0.0073	2.8167	0.0487
ERROR	0.1276	0.8529	49.	0.0026		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 49.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOTMATHF		0.9236	0.0516	17.9129		0.0202
INDEPENDENT VARIABLES						
APPLE-5	-0.2035	-0.0790	0.0538	-1.4685	-0.0375	0.0938
APPLE-6	0.2115	0.0823	0.0548	1.5025	-0.0393	0.1213
APPLE-7	0.2391	0.0926	0.0557	1.6628	-0.0481	0.1585

Table A.36

Regression Parameters for Teaching Performance Variables; Grade 5 Mathematics Residual Scores

Performance Variable	|R|	$\sigma_{y \cdot x}$	df	p	Prop. of SQ.
WD - 1	.03	.05	53	.85	.00
WD - 2	.14	.05	53	.32	.02
WD - 3	.01	.05	53	.94	.00
WD - 4	.25	.05	53	.08	.06
WD - 5	.15	.05	53	.27	.02
RA - 1	.05	.05	53	.71	.002
RA - 2	.10	.05	53	.48	.01
RA - 3	.01	.05	53	.95	.00
RA - 4	.09	.05	53	.54	.01
AP - 1	.05	.05	53	.75	.002
AP - 2	.43 (-.43)*	.05	53	.001	.18
AP - 3	.18	.05	53	.19	.03
AP - 5	.28 (-.28)	.05	53	.04	.08
AP - 6	.17	.05	53	.23	.03
AP - 7	.23	.05	53	.10	.05
AP - 8	.05	.05	53	.74	.002
AP - 9	.02	.05	53	.89	.00
AP - 10	.18	.05	53	.19	.03
AP - 11	.07	.05	53	.64	.004
AP - 12	.05	.05	53	.73	.002
AP - 13	.18	.05	53	.21	.03
AP - 14	.04	.05	53	.78	.001

*Note that the column values are the absolute values of R. The sign of R is given for significant R's.

All Variables	APPLE Variables	APPLE Groups	SEPARATELY
WD-4 (+)	AP-1 (-)		WD-4 (p = .08) (+)
AP-2 (-)	AP-2 (-)	AP-2 (-)	AP-2 (-)
AP-3 (-)			AP-5 (-)
AP-7 (+)	AP-7 (+)	AP-7 (+)	AP-7 (p = .10) (+)
AP-10 (+)			
AP-13 (+)			

AP-2 and AP-7 appear to be significant ($p \leq .10$) in all these analyses. Each alone accounts for a considerable proportion of the variance in spring scores, 18 and 5 percent respectively, after fall scores are partialled out. AP-5 which appears in the last analysis accounts alone for 8 percent of the variance.

The variables found significant in these analyses account separately for 3 to 18 percent of the variance, except AP-1 which accounts for less than one percent. We turn now to the stepwise regression analysis where the variables are entered in terms of the magnitude of their contribution to R^2.

Stepwise Regressions: Grade 5 Mathematics; Residual Scores

Tables A.37 and A.38 present two of the stepwise regressions of residual scores in mathematics on the teaching performance variables. Step 2 and Step 9 are presented; after Step 9 the significance of F begins to decrease.

At Step 9, $R = .72$ and $R^2 = .51$. These variables account for 51 percent of the variance. All the regression weights except one, AP-10 are significant.

Table A.37

Stepwise Regression of Residual Scores on Teaching Performances (Step 2);
Grade 5 Mathematics (N = 54)

GRADE 5 MATH

THE DEPENDENT VARIABLE IS TOTMATHS. THE MULTIPLE CORRELATION IS 0.4760. THE STANDARD ERROR OF ESTIMATE= 0.0481

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		53.			
UNDER NULL HYPOTHESIS	0.1496	1.0000	52.			
DUE TO HYPOTHESIS	0.0339	0.2266	2.	0.0170	7.3233	0.0016
ERROR	0.1157	0.7734	50.	0.0023		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 50.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOTMATHF		0.9595	0.0494	19.4151		0.0522
INDEPENDENT VARIABLES						
APPLE-2	-0.4435	-0.1762	0.0496	-3.5532	-0.1953	0.0073
APPLE-13	0.2147	0.0831	0.0483	1.7199	-0.0458	0.0073
OTHER VARIABLES				NOW 49.D.F.		
WD-3	-0.0287	-0.0114	0.0499	-0.2280	0.0008	0.0016
WD-4	0.2272	0.0896	0.0492	1.8206	0.0490	0.0503
WD-5	-0.1996	-0.0789	0.0486	-1.6237	0.0395	0.0088
RAMOS-1	0.0421	0.0165	0.0522	0.3159	0.0016	0.1141
RAMOS-2	0.1496	0.0581	0.0499	1.1633	0.0208	0.0716
RAMOS-3	0.0355	0.0139	0.0551	0.2525	0.0010	0.2021
RAMOS-4	0.0417	0.0161	0.0518	0.3114	0.0015	0.1223
APPLE-1	-0.1798	-0.0696	0.0494	-1.4107	0.0302	0.0664
WD-1	-0.0925	-0.0358	0.0491	-0.7282	0.0083	0.0312
APPLE-3	0.0507	0.0196	0.0507	0.3868	0.0024	0.0828
APPLE-5	-0.0498	-0.0193	0.0588	-0.3289	0.0017	0.3141
APPLE-6	0.0574	0.0224	0.0503	0.4465	0.0031	0.0580
APPLE-7	0.2009	0.0778	0.0475	1.6397	0.0402	0.0036
APPLE-8	0.0114	0.0044	0.0488	0.0902	0.0001	0.0099
APPLE-9	-0.0435	-0.0171	0.0502	-0.3409	0.0018	0.0334
APPLE-10	0.1853	0.0724	0.0481	1.5059	0.0342	0.0038
APPLE-11	0.0912	0.0354	0.0506	0.6997	0.0077	0.0798
APPLE-12	0.0963	0.0373	0.0486	0.7669	0.0092	0.0113
WD-2	0.1152	0.0446	0.0487	0.9159	0.0130	0.0197
APPLE-14	-0.0102	-0.0040	0.0498	-0.0808	0.0001	0.0063

Table A.38

Stepwise Regression of Residual Scores on Teaching Performances (Step 9);
Grade 5 Mathematics (N = 54)

GRADE 5 MATH

THE DEPENDENT VARIABLE IS TOTMATHS. THE MULTIBLE CORRELATION IS 0.7157. THE STANDARD ERROR OF ESTIMATE= 0.0412

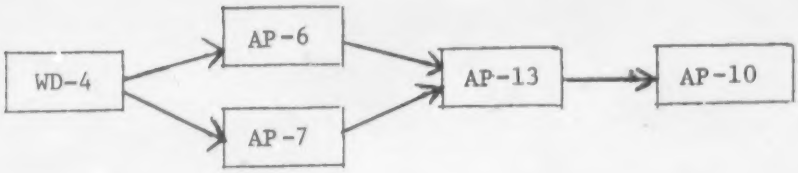
	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		53.			
UNDER NULL HYPOTHESIS	0.1496	1.0000	52.			
DUE TO HYPOTHESIS	0.0766	0.5122	9.	0.0085	5.0164	0.0001
ERROR	0.0730	0.4878	43.	0.0017		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 43.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
CONCOMITANT VARIABLES						
TOTMATHF		1.0017	0.0454	22.0535		0.1771
INDEPENDENT VARIABLES						
APPLE-2	-0.4484	-0.1782	0.0466	-3.8229	-0.1658	0.1754
APPLE-13	0.3161	0.1223	0.0429	2.8507	-0.0922	0.0773
WD-4	0.3780	0.1491	0.0457	3.2649	-0.1209	0.1536
WD-5	-0.2704	-0.1069	0.0458	-2.3336	-0.0618	0.1550
APPLE-7	0.4267	0.1653	0.0521	3.1700	-0.1140	0.3739
APPLE-10	0.1611	0.0629	0.0469	1.3401	-0.0204	0.2147
APPLE-1	-0.1993	-0.0772	0.0436	-1.7706	-0.0356	0.1048
APPLE-3	-0.2417	-0.0935	0.0539	-1.7360	-0.0342	0.4148
APPLE-6	0.2437	0.0949	0.0552	1.7194	-0.0335	0.4353
OTHER VARIABLES				NOW 42.D.F.		
RAMCS-2	0.0386	0.0150	0.0465	0.3219	0.0012	0.1025
WD-1	-0.1370	-0.0530	0.0478	-1.1098	0.0139	0.2600
RAMCS-3	-0.0684	-0.0268	0.0553	-0.4855	0.0027	0.4177
APPLE-5	0.0300	0.0116	0.0533	0.2182	0.0006	0.3861
RAMCS-4	-0.0669	-0.0259	0.0505	-0.5128	0.0030	0.3211
WD-3	-0.0576	-0.0228	0.0444	-0.5142	0.0031	0.0793
APPLE-8	0.1345	0.0520	0.0484	1.0740	0.0130	0.2788
APPLE-9	-0.0357	-0.0140	0.0483	-0.2906	0.0010	0.2306
RAMCS-1	-0.0229	-0.0090	0.0476	-0.1882	0.0004	0.2131
APPLE-11	0.1168	0.0454	0.0451	1.0048	0.0115	0.1603
APPLE-12	0.0598	0.0231	0.0515	0.4492	0.0023	0.3466
WD-2	0.0310	0.0120	0.0554	0.2166	0.0005	0.4342
APPLE-14	-0.1360	-0.0537	0.0537	-1.0015	0.0114	0.3851

Five have positive regression weights, AP-13, WD-4, AP-7, AP-6 and AP-10 (n.s.). These variables are:

(+) WD-4: Amount of Instruction by the Teacher
(+) AP-6: Teacher-group
(+) AP-7: Teacher-class
(+) AP-10: Interactive Teaching Activities
(+) AP-13: Teacher Response-Social Control

We see here again a pattern we have observed before when analyzing the residual scores. This pattern may be represented by this model:



The teacher decides to use either the class or groups as the context and conducts the instruction, maintains on-task behavior, and while instructing, explains, discusses, and questions and answers in a sustained manner.

The variables with negative weights are AP-2, WD-5, AP-1, AP-3. These variables are:

AP-1: Mathematics Productivity
AP-2: Inattentive Behavior
AP-3: Attentiveness
WD-5: Variety of Materials

Before attempting to interpret these variables we present the intercorrelations among all the predictors.

r

	WD-4	WD-5	AP-1	AP-2	AP-3	AP-6	AP-7	AP-10
WD-4								
WD-5	.16							
AP-1	-.03	.11						
AP-2	-.19	-.02	-.21					
AP-3	-.05	-.16	.11	-.26				
AP-6	-.12	.09	.17	-.20	.33			
AP-7	-.10	.02	.09	-.05	.45	.06		
AP-10	-.23	.01	.02	.01	.07	.06	-.07	
AP-13	-.18	-.17	.11	.09	.30	.04	.21	.08

AP-1, AP-2 and AP-3 are pupil behavior variables. AP-1 (productivity) and AP-2 (inattentiveness) are negatively related but AP-1 and AP-3 (attentiveness) are positively but not significantly correlated. AP-3 and AP-13 (social control) are significantly and positively correlated (for $r = .24$, $p = .05$). Thus, when the teacher's scores are high on AP-13, students' scores on AP-3 are high. This relation is more important than the negative regression weight of AP-3.

AP-1's relation to the residual scores is so small that its negative weight is probably accounted for by the fitting of the regression plane rather than some behavioral relation. Also, AP-1 is composed of three components each of whose relations with outcome measures is variable (see Volume III, Chapter 1, p.101).

WD-5 seems to be negatively related to learning. We previously offered the interpretation that diversity of materials in itself may or may not contribute to effective teaching. Actually such diversity may interfere if not properly managed.

Regression Analyses - Grade 5 - Mean Gain Scores

In the preceding pages we have presented the regression of residual scores against teaching performance variables. In this section we present the regression of mean gain scores against these variables. These analyses will tell us the relation of the teaching performances to the gains in reading and mathematics over the year.

Multiple Regressions: Reading - Grade 5

We consider first the regression of the mean gains against all the performance variables. Table A.39 presents the results of this analysis. The F-value is not significant. When the variables were grouped by instrument, none of the R's were significant.

The mean gain scores were regressed against the teaching performance variables, one variable at a time. The results of this analysis are presented in Table A.40. Only one variable, AP-8 (instructional facilitating) is significant at the .05 level and accounts for 8 percent of the variance when fall scores are partialled out. R-3 (diversity of material) is also significant ($p \leq .10$), and accounts for 5 percent of the variance.

Stepwise Regressions: Reading - Grade 5

Tables A.41 and A.42 present the stepwise regressions of mean gain scores in reading on the teaching performance variables. The variables were entered successively in terms of the magnitude of their contribution to R^2. Both Step 1 and Step 2 are presented to show what is happening.

Table A.39

Multiple Regression of Mean Gain Scores Against Teaching Performance Variables; Grade 5 Reading (N = 53)

CLASS AVE. GAIN ANALYSIS ON FSA DATA BASE - GRADE 5 READING

THE DEPENDENT VARIABLE IS TOTREAD , THE MULTIPLE CORRELATION IS 0.6076, THE STANDARD ERROR OF ESTIMATE= 0.1450

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		52.			
UNDER NULL HYPOTHESIS	1.0000	1.0000	52.			
DUE TO HYPOTHESIS	0.3692	0.3692	22.	0.0168	0.7981	0.7048
ERROR	0.6308	0.6308	30.	0.0210		

INDEPENDENT VARIABLES	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 30 D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
WD-1	-0.0749	-0.0749	0.2088	-0.3588	-0.0027	0.5176
WD-2	0.2457	0.2457	0.2260	1.0870	-0.0248	0.5885
WD-3	-0.1625	-0.1625	0.1846	-0.8801	-0.0163	0.3831
WD-4	0.1375	0.1375	0.1862	0.7387	-0.0115	0.3933
WD-5	-0.2672	-0.2672	0.2210	-1.2089	-0.0307	0.5696
RAMOS-1	0.2900	0.2900	0.2486	1.1666	-0.0286	0.6598
RAMOS-2	-0.0849	-0.0849	0.2422	-0.3506	-0.0026	0.6416
RAMOS-3	-0.3988	-0.3988	0.2719	-1.4664	-0.0452	0.7156
RAMOS-4	0.2324	0.2324	0.2278	1.0199	-0.0219	0.5949
APPLE-1	-0.1799	-0.1799	0.2206	-0.8154	-0.0140	0.5678
APPLE-2	-0.4166	-0.4166	0.2688	-1.5500	-0.0505	0.7089
APPLE-3	-0.2874	-0.2874	0.2555	-1.1249	-0.0266	0.6778
APPLE-5	0.1053	0.1053	0.2593	0.4062	-0.0035	0.6872
APPLE-6	0.4426	0.4426	0.3226	1.3717	-0.0396	0.7980
APPLE-7	0.1672	0.1672	0.2786	0.6002	-0.0076	0.7292
APPLE-8	-0.1736	-0.1736	0.1999	-0.8686	-0.0159	0.4736
APPLE-9	0.0467	0.0467	0.1939	0.2406	-0.0012	0.4410
APPLE-10	0.2992	0.2992	0.1999	1.4966	-0.0471	0.4739
APPLE-11	0.2788	0.2788	0.2028	1.3744	-0.0397	0.4889
APPLE-12	-0.0352	-0.0352	0.2178	-0.1618	-0.0006	0.5568
APPLE-13	-0.0381	-0.0381	0.1972	-0.1934	-0.0003	0.4591
APPLE-14	-0.0209	-0.0209	0.1920	-0.1087	-0.0002	0.4296

Table A.40

Regression Parameters for Teaching Performance Variables; Mean Gain Scores; Grade 5 Reading

Performance Variable	|R|	$\sigma_{y.x}$	df	p	Prop. of SQ.
WD-1	.16	.14	52	.26	.02
WD-2	.08	.14	52	.55	.01
WD-3	.13	.14	52	.35	.02
WD-4	.18	.14	52	.20	.03
WD-5	.12	.14	52	.40	.01
RA-1	.11	.14	52	.45	.01
RA-2	.14	.14	52	.31	.02
RA-3	.24(-.24)	.14	52	.09	.05
RA-4	.03	.14	52	.82	.00
AP-1	.01	.14	52	.93	.00
AP-2	.20	.14	52	.15	.04
AP-3	.04	.14	52	.76	.00
AP-5	.07	.14	52	.62	.00
AP-6	.02	.14	52	.90	.00
AP-7	.05	.14	52	.71	.00
AP-8	.28(-.28)	.14	52	.04	.08
AP-9	.12	.14	52	.38	.01
AP-10	.18	.14	52	.20	.03
AP-11	.02	.14	52	.87	.00
AP-12	.07	.14	52	.64	.00
AP-13	.14	.14	52	.33	.02
AP-14	.12	.14	52	.39	.01

*Note that the column values are the absolute values of R. The sign of R is given for significant R's.

Table A.41

Stepwise Regression of Mean Gain Scores on Teaching Performance Variables (Step 1); Grade 5 Reading (N = 53)

CLASS AVE. GAIN ANALYSIS ON FSA DATA BASE - GRADE 5 READING

THE DEPENDENT VARIABLE IS TGTREAD . THE MULTIPLE CORRELATION IS 0.2777, THE STANDARD ERROR OF ESTIMATE= 0.1345

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		52.			
UNDER NULL HYPOTHESIS	1.0000	1.0000	52.			
DUE TO HYPOTHESIS	0.0771	0.0771	1.	0.0771	4.2602	0.0441
ERROR	0.9229	0.9229	51.	0.0181		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 51.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
INDEPENDENT VARIABLES						
APPLE-8	-0.2777	-0.2777	0.1345	-2.0640	-0.0771	0.0
OTHER VARIABLES				NOW 50.D.F.		
WD-2	0.0699	0.0699	0.1357	0.5148	0.0049	0.0028
WD-3	-0.0888	-0.0888	0.1370	-0.6482	0.0077	0.0243
WD-4	0.1685	0.1685	0.1339	1.2585	0.0283	0.0016
WD-5	-0.1155	-0.1155	0.1349	-0.8562	0.0133	0.0003
RAMOS-1	-0.0443	-0.0443	0.1395	-0.3176	0.0019	0.0534
RAMOS-2	-0.0832	-0.0832	0.1388	-0.5994	0.0066	0.0491
RAMOS-3	-0.1649	-0.1649	0.1414	-1.1661	0.0244	0.1010
RAMOS-4	0.0691	0.0691	0.1440	0.4802	0.0042	0.1137
APPLE-1	0.0161	0.0161	0.1366	0.1178	0.0003	0.0106
APPLE-2	-0.1600	-0.1600	0.1356	-1.1799	0.0250	0.0235
APPLE-3	0.0368	0.0368	0.1358	0.2714	0.0014	0.0005
APPLE-5	-0.0708	-0.0708	0.1355	-0.5225	0.0050	0.0000
APPLE-6	0.0166	0.0166	0.1369	0.1212	0.0003	0.0152
APPLE-7	0.0772	0.0772	0.1359	0.5679	0.0059	0.0073
WD-1	-0.1132	-0.1132	0.1370	-0.8261	0.0124	0.0297
APPLE-9	0.0772	0.0772	0.1376	0.5615	0.0056	0.0308
APPLE-10	0.1781	0.1781	0.1335	1.3343	0.0317	0.0000
APPLE-11	0.0041	0.0041	0.1362	0.0301	0.0000	0.0050
APPLE-12	-0.0463	-0.0463	0.1361	-0.3405	0.0021	0.0052
APPLE-13	-0.1467	-0.1467	0.1343	-1.0918	0.0215	0.0011
APPLE-14	-0.0713	-0.0713	0.1380	-0.5167	0.0049	0.0360

Table A. 42

Stepwise Regression of Mean Gain Scores on Teaching Performance Variables (Step 2); Grade 5 Reading (N = 53)

CLASS AVE. GAIN ANALYSIS ON FSA DATA BASE - GRADE 5 READING

THE DEPENDENT VARIABLE IS TOTREAD , THE MULTIPLE CORRELATION IS 0.3299. THE STANDARD ERROR OF ESTIMATE= 0.1335

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		52.			
UNDER NULL HYPOTHESIS	1.0000	1.0000	52.			
DUE TO HYPOTHESIS	0.1088	0.1088	2.	0.0544	3.0529	0.0561
ERROR	0.8912	0.8912	50.	0.0178		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTIC WITH 50.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
INDEPENDENT VARIABLES						
APPLE-8	-0.2768	-0.2768	0.1335	-2.0730	-0.0766	0.0000
APPLE-10	0.1781	0.1781	0.1335	1.3343	-0.0317	0.0000
OTHER VARIABLES				NOW 49.D.F.		
WD-3	-0.1128	-0.1128	0.1366	-0.8257	0.0122	0.0392
WD-4	0.1794	0.1794	0.1327	1.3513	0.0320	0.0049
WD-5	-0.1476	-0.1476	0.1350	-1.0934	0.0212	0.0256
RAMOS-1	-0.0676	-0.0676	0.1393	-0.4849	0.0043	0.0674
RAMOS-2	-0.1111	-0.1111	0.1383	-0.8006	0.0115	0.0679
RAMOS-3	-0.1803	-0.1803	0.1403	-1.2847	0.0290	0.1063
RAMOS-4	0.0763	0.0763	0.1429	0.5340	0.0052	0.1150
APPLE-1	0.0023	0.0023	0.1360	0.0172	0.0000	0.0165
APPLE-2	-0.1471	-0.1471	0.1353	-1.0877	0.0210	0.0292
APPLE-3	-0.0072	-0.0072	0.1391	-0.0516	0.0000	0.0603
APPLE-5	-0.0312	-0.0312	0.1386	-0.2252	0.0009	0.0537
APPLE-6	-0.0011	-0.0011	0.1366	-0.0084	0.0000	0.0248
APPLE-7	-0.0105	-0.0105	0.1540	-0.0683	0.0001	0.2333
WD-1	-0.0862	-0.0862	0.1382	-0.6238	0.0070	0.0550
APPLE-9	0.0795	0.0795	0.1365	0.5820	0.0061	0.0309
WD-2	0.0624	0.0624	0.1349	0.4630	0.0039	0.0046
APPLE-11	0.0763	0.0763	0.1440	0.5298	0.0051	0.1280
APPLE-12	-0.0752	-0.0752	0.1364	-0.5516	0.0055	0.0282
APPLE-13	-0.1420	-0.1420	0.1335	-1.0637	0.0201	0.0018
APPLE-14	-0.0886	-0.0886	0.1374	-0.6452	0.0075	0.0441

After Step 2, the significance level begins to rise though the mean square continues to drop. At Step 4, $p = .0566$, the mean square ("due to hypothesis") is .0428, and two variables have been added, WD-4 and R-3, and none of the regression weights are significant.

The best point to stop seems to be Step 2. Thus, AP-8 (instructional facilitating) and AP-10 (interactive teaching activities) are contributing to the prediction. But AP-8 has a negative regression weight.

AP-8 is facilitating behaviors such as academic organizing and minor instructional behaviors such as answering questions as they occur, for example, as a child works on a project. Since AP-10 is an opposite (sustained instructional activity such as explaining and discussing) of AP-8, the more a teacher instructs while interacting, the greater the gains. AP-8 behaviors are not necessarily to be avoided; but a predominant pattern of AP-8 is related to lower scores.

Multiple Regressions: Mathematics - Grade 5

Table A.43 presents the results of regressing mean gain scores on teaching performance variables. $R = .80$ and is significant ($p < .01$). $R^2 = .64$ indicating that the set of variables accounts for 64 percent of the variance in mean gains. R-4, AP-2, AP-6, AP-7, AP-10 and AP-13 have significant regression weights. AP-6, AP-7, AP-10 and AP-13 have positive signs.

When the variables are grouped by instrument, APPLE variables produce a significant $R = .69$ for which $p = .0074$, and $R^2 = .47$. Other groups, WD's and R's did not produce significant R's.

Table A.44 presents the results of the regressions of mean gain scores against each variable separately. Two variables have significant R's at the .05 level, AP-2 and AP-5. WD-4 is also significant ($p = .10$).

Table A.43

Multiple Regression of Mean Gain Scores on Teaching Performance Variables;
Grade 5 Mathematics (N = 54)

CLASS AVE. GAIN ANALYSIS ON FSA DATA BASE - GRADE 5 MATH

THE DEPENDENT VARIABLE IS TOTMATH . THE MULTIPLE CORRELATION IS 0.7988. THE STANDARD ERROR OF ESTIMATE= 0.106

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		53.			
UNDER NULL HYPOTHESIS	1.0000	1.0000	53.			
DUE TO HYPOTHESIS	0.6380	0.6380	22.	0.0290	2.4840	0.0099
ERROR	0.3620	0.3620	31.	0.0117		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 31.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
INDEPENDENT VARIABLES						
WD-1	-0.1237	-0.1237	0.1524	-0.8118	-0.0077	0.4973
WD-2	0.1747	0.1747	0.2190	0.7977	-0.0074	0.7565
WD-3	-0.0628	-0.0628	0.1407	-0.4466	-0.0023	0.4103
WD-4	0.1782	0.1782	0.1709	1.0426	-0.0127	0.6002
WD-5	-0.0853	-0.0853	0.1291	-0.6605	-0.0051	0.2993
RANDS-1	0.0032	0.0032	0.2021	0.0159	-0.0000	0.7142
RANDS-2	0.3278	0.3278	0.2600	1.2608	-0.0186	0.8272
RANDS-3	0.0873	0.0873	0.2392	0.3651	-0.0016	0.7959
RANDS-4	-0.4865	-0.4865	0.2479	-1.9623	-0.0450	0.8100
APPLE-1	-0.2555	-0.2555	0.1689	-1.5133	-0.0267	0.5905
APPLE-2	-0.6484	-0.6484	0.1842	-3.5197	-0.1446	0.6560
APPLE-3	-0.2604	-0.2604	0.1695	-1.5365	-0.0276	0.5934
APPLE-5	0.0114	0.0114	0.1690	0.0677	-0.0001	0.5913
APPLE-6	0.2992	0.2992	0.1803	1.6595	-0.0321	0.6410
APPLE-7	0.4018	0.4018	0.1606	2.5008	-0.0735	0.5476
APPLE-8	0.1475	0.1475	0.1482	1.0089	-0.0119	0.4540
APPLE-9	-0.0154	-0.0154	0.1789	-0.0859	-0.0001	0.6350
APPLE-10	0.2751	0.2751	0.1628	1.6901	-0.0334	0.5594
APPLE-11	0.1153	0.1153	0.1412	0.8164	-0.0078	0.4145
APPLE-12	-0.0039	-0.0039	0.1895	-0.0206	-0.0000	0.6750
APPLE-13	0.3549	0.3549	0.1348	2.6316	-0.0809	0.3578
APPLE-14	-0.1007	-0.1007	0.1958	-0.5198	-0.0032	0.6891

Table A.44

Regression Parameters for Teaching Performance Variables; Mean Gain Scores; Grade 5 Mathematics (N = 54)

Performance Variable	|R|	$\sigma_{y.x}$	df	p	Prop. of SQ.
WD-1	.05	.14	53	.71	.00
WD-2	.13	.14	53	.36	.01
WD-3	.02	.14	53	.89	.00
WD-4	.23	.14	53	.10	.05
WD-5	.12	.14	53	.39	.01
RA-1	.08	.14	53	.55	.01
RA-2	.13	.14	53	.36	.02
RA-3	.01	.14	53	.93	.00
RA-4	.05	.14	53	.74	.00
AP-1	.04	.14	53	.79	.00
AP-2	.52(-.52)*	.14	53	.00	.27
AP-3	.18	.14	53	.18	.03
AP-5	.31(-.31)	.14	53	.02	.10
AP-6	.15	.14	53	.26	.02
AP-7	.18	.14	53	.19	.03
AP-8	.03	.14	53	.80	.00
AP-9	.04	.14	53	.76	.00
AP-10	.10	.14	53	.47	.01
AP-11	.13	.14	53	.34	.02
AP-12	.05	.14	53	.70	.00
AP-13	.19	.14	53	.17	.04
AP-14	.06	.14	53	.67	.01

*Note that the column values are the absolute values of R. The sign of R is given for significant R's.

Stepwise Regressions: Mathematics - Grade 5

Table A.45 presents the stepwise regression of mean gain scores on teaching performance variables at Step 13, after which the value of $\underline{p}$ and the mean square begin to increase. R = .79 and is highly significant ($\underline{p} \leq .0001$), and $R^2 = .62$. Teaching performance variables account for almost two thirds of the variance in mean gain scores. Ten of the variables have significant regression weights. AP-13, R-2, AP-7 and AP-6, WD-4 and AP-10 have positive weights. AP-2, R-4, AP-1 and AP-3 have negative weights.

We have observed this pattern before, one in which the teacher does the instructing (WD-4) and either of two structural arrangements are used, AP-6 (teacher-group) and AP-7 (teacher class). R-2 is a measure of the range of instructional goals. AP-13 is a social control variable in which the teacher keeps the students task-oriented.

AP-2 (inattentiveness) is a negative predictor. AP-2 and AP-13 have an $\underline{r} = .09$ indicating that these two variables are probably not related. But there is about as much inattentive behavior in the classrooms of the top five teachers (as selected from the $\underline{b} \times \underline{c}$ plots portrayed in Chapter 7) as in the classes of the bottom five teachers (see Volume III, Chapter 1, p. 153). But the analysis here suggests that the proportion of AP-13 to AP-2 may be a critical factor related to differences in mean gains. Teachers who engage in more performances to keep students task-oriented have higher mean gain scores ($\underline{r} = .19$).

The reader should see N. Lambert's discussion of what the differences between the top and bottom groups of teachers seem to be in this respect (see Volume III, Chapter 1, p.153). In general, those in the top group use more redirecting behaviors to cope with inattentiveness.

Table A.45

Stepwise Regression of Mean Gain Scores on Teaching Performances (Step 13); Grade 5 Mathematics (N=54)

CLASS AVE. GAIN ANALYSIS ON FSA DATA BASE - GRADE 5 MATH U

THE DEPENDENT VARIABLE IS TOTMATH . THE MULTIPLE CORRELATION IS 0.7865. THE STANDARD ERROR OF ESTIMATE= 0.0977

	SUM OF SQUARES	PROPORTION OF SQUARES	N.D.F.	MEAN SQUARE	F RATIO	PROBABILITY OF LARGER F
TOTAL ABOUT ORIGIN	1.0000		53.			
UNDER NULL HYPOTHESIS	1.0000	1.0000	53.			
DUE TO HYPOTHESIS	0.6186	0.6186	13.	0.0476	4.9898	0.0000
ERROR	0.3814	0.3814	40.	0.0095		

	STANDARD REG. WEIGHT	REGRESSION WEIGHTS	STANDARD ERROR OF WT.	T STATISTICS WITH 40.D.F.	CONTRIBUTION TO R-SQ.	MEASURE OF COLLINEARITY
INDEPENDENT VARIABLES						
APPLE-2	-0.6463	-0.6463	0.1125	-5.7429	-0.3145	0.2471
APPLE-13	0.3497	0.3497	0.1115	3.1354	-0.0937	0.2332
RAMOS-2	0.4292	0.4292	0.1648	2.6042	-0.0647	0.6490
RAMOS-4	-0.4611	-0.4611	0.1712	-2.6933	-0.0692	0.6746
APPLE-7	0.3689	0.3689	0.1292	2.8545	-0.0777	0.4290
APPLE-1	-0.2284	-0.2284	0.1064	-2.1462	-0.0439	0.1583
APPLE-6	0.2879	0.2879	0.1334	2.1578	-0.0444	0.4642
WD-4	0.2541	0.2541	0.1175	2.1637	-0.0446	0.3088
APPLE-10	0.2247	0.2247	0.1197	1.8769	-0.0386	0.3345
APPLE-3	-0.2500	-0.2500	0.1444	-1.7317	-0.0286	0.5425
WD-1	-0.1401	-0.1401	0.1153	-1.2151	-0.0141	0.2828
* APPLE-8	0.1273	0.1273	0.1164	1.0930	-0.0114	0.2965
* APPLE-11	0.1083	0.1083	0.1173	0.9232	-0.0081	0.3072
OTHER VARIABLES				NOW 39.D.F.		
WD-3	-0.0199	-0.0199	0.1163	-0.1708	0.0003	0.2780
WD-5	-0.0944	-0.0944	0.1109	-0.8511	0.0070	0.2189
RAMOS-1	0.0117	0.0117	0.1540	0.0757	0.0001	0.5876
APPLE-9	-0.0528	-0.0528	0.1132	-0.4664	0.0021	0.2413
RAMOS-3	0.0280	0.0280	0.1830	0.1528	0.0002	0.7080
APPLE-5	-0.0115	-0.0115	0.1367	-0.0841	0.0001	0.4767
APPLE-12	-0.0185	-0.0185	0.1320	-0.1403	0.0002	0.4386
WD-2	0.1058	0.1058	0.1429	0.7405	0.0053	0.5275
APPLE-14	-0.0380	-0.0380	0.1289	-0.2948	0.0008	0.4127

Those in the bottom group use more disciplining techniques which interrupt the instructional process.

In AP-6, AP-7 and AP-13 we have performances which involve increasing instructional time with the teacher and which keep the instructional process moving when disruptive or inappropriate events occur.

R-4 (teaching activity) is a negative predictor. This variable is weighted most by independent seatwork (see Chapter 6 for the weighting of components in the category scores). R-4 correlates .04 with mean gains which means that this category is unrelated to mean gains. Considered in relation to other variables, it is a negative predictor. Further, we have seen that AP-6 and AP-7 are positive predictors. It seems reasonable to hypothesize that the proportion of AP-6 to R-4 and AP-7 to R-4 are critical factors in predicting mean gains. These ratios are essentially the ratios of direct instruction to independent work. The reader is reminded again that independent seatwork, the major component of R-4, is not in itself necessarily an undesirable activity; rather, it is its relative time that is the probable determinant of effective teaching.

Summary and Interpretation - Grade 5

Table A.46 summarizes the variables found significant in all these analyses by type of anlaysis and type of score. Again we have included only variables with significant regression weights or R's (for which $p \leq .10$). We look for trends in the data by counting the frequency of occurrence of a variable's appearance in Table A.46.

Reading

First, consider the frequency of appearance of the variables in the Reading analyses.

Table A.46

Summary of Significant Grade 5 Teacher Performance Variables Listed by Type of Analysis
(Total Group: $N_R = 53$; $N_M = 54$)

	A. All Variables		B. Regular Multiple Regressions by Variables		C. Stepwise Regressions	
	Residual Scores	Mean Gains	Residual Scores	Mean Gains	Residual Scores	Mean Gains
Reading	n.s	n.s.*	WD-1 (-) R-3 (-) AP-8(-)	R-3 (-) AP-8 (-)	R-4 (+) AP-10(+) WD-5 (-) R-3 (-) AP-2 (-)	AP-8 (-)
Mathematics	WD-4 (+) AP-7 (+) AP-10(+) AP-13(+) AP-2 (-) AP-3 (-)	AP-6 (+) AP-7 (+) AP-10(+) AP-13(+) R-4 (-) AP-2 (-)	WD-4 (+) AP-7 (+) AP-2 (-) AP-5 (-)	WD-4 (+) AP-2 (-) AP-5 (-)	WD-4 (+) AP-6 (+) AP-7 (+) AP-13(+) WD-5 (-) AP-1 (-) AP-2 (-) AP-3 (-)	WD-4 (+) R-2 (+) AP-6 (+) AP-7 (+) AP-10(+) AP-13(+) R-4 (-) AP-1 (-) AP-2 (-) AP-3 (-)

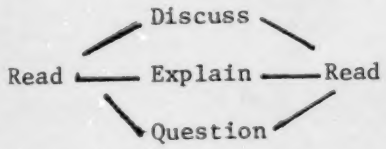
Number of Times Listed as Positive and Significant

1	2
R-4	
AP-10	

Number of Times Listed as Negative and Significant

1	2	3	4
WD-1		R-3	
WD-5		AP-8	
AP-2			

Only two variables appear as positive predictors, R-4 (teaching activity) and AP-10 (instructional activity). R-4, again, is weighted with independent seatwork and high scores on AP-10 mean that the teacher is using a variety of teaching techniques - discussing, explaining, listening, and questioning and answering. The picture is one of teacher interacting instructionally with the students and providing opportunity for reading. The underlying model suggested is



This model seems relevant since most teachers are stressing reading comprehension in fifth grade.

The negative predictors occurring most frequently are R-3 (variety of materials) and AP-8 (academic organizing). AP-8 is a necessary performance. But here we are asking, what is the effect of performing these behaviors frequently (high scores on AP-8)?

In teaching if one event occurs frequently, some other event must occur less frequently. Considerable time spent organizing to instruct leaves less time available for instructing. It is interesting that AP-10, instructing, is a positive predictor and AP-8, organizing, a negative predictor. More time spent organizing to instruct may be reducing the time for instructing.

WD-5 (variety of materials), a negative predictor, is, as we have suggested before, a variable which may have beneficial or inhibitary effects. AP-2 is always an index of low task involvement. WD-1 (time spent) ought to be a positive predictor, other things being equal. WD-1 is a measure of amount not of quality; in fact, for Grade 5 Reading, the correlation between WD-1 and WD-3 (a rating of quality) is .04. Also between AP-10 and WD-1, $r = -.16$; and between AP-8 and WD-1, $r = .17$. Although these coefficients are not significant at the .05 level, they suggest support for the point that time spent in itself is not a critical factor, though obviously there is a minimum amount required for improvement.

Mathematics

The frequency of occurrence of the significant variables in Grade 5 Mathematics is listed below:

Number of Times Listed as Positive and Significant

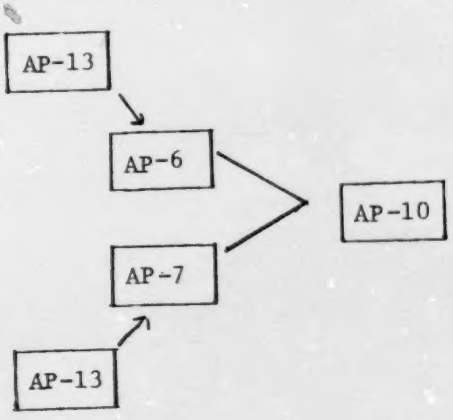
1	2	3	4	5
R-2		AP-6		WD-4
		AP-10	AP-13	AP-7

Number of Times Listed as Negative and Significant

1	2	3	4	5	6
WD-5	R-4	AP-3			AP-2
	AP-1				
	AP-5				

The most frequently appearing and positively related variables are AP-7 (teacher-class) and WD-4 (amount of instruction by teacher). But before concluding that instruction of the total class is the best instructional context, note also that AP-6 (teacher-group) also occurs O.K.

There is a cluster of variables appearing frequently, AP-6 and AP-7, AP-10, AP-13. They suggest a model:



The teacher uses both large and small group instruction, mainly or solely conducts this instruction himself or herself (WD-4), and uses a variety of interactive instructional techniques such as discussing, explaining and questioning and answering (AP-10). R-2 (variety of instructional goals) suggests that the teacher varies instruction, practice and review.

The negative predictors, WD-5 (variety of materials) and AP-2 (inattentiveness) we have seen previously as negative predictors. AP-1 which is an index of the correctness of the students' answers in class and AP-3 (attentiveness) are difficult to explain as negative predictors unless one keeps in mind that these behaviors are likely to have different effects in combination with other variables. The negative weight of AP-1 may mean that "correctness" in itself does not contribute positively to the prediction but in combination with other variables becomes a negative predictor. AP-3 (attentiveness) may characterize classes in which there is relatively less instruction, AP-10. But the relation of AP-3 to other context and instructional variables is positive and significant as can be seen below:

	AP-3
AP-3	-
AP-6	.38
AP-7	.33
AP-8	.45
AP-10	.27

In general, AP-3 (attentiveness) is a necessary but not a sufficient condition for learning. Teaching performances related to increasing AP-3 seem to be those listed above. Now consider the r between AP-13 and AP-3 where $r = .07$. Social control (AP-13) may not be sufficient in itself, but AP-13 is weighted with redirecting behaviors.

Thus if the teacher is instructing (AP-6 and AP-10 or AP-7 and AP-10), the student can be redirected to or become more involved in the instructional task. In a class where AP-3 is high but AP-10 is low, attentiveness is observed but the students are not learning as much.

AP-5 (independent work) is a negative predictor. We suspect that AP-5 combined with low scores on the instructional variables accounts for AP-5's negative weight.

Variables Predictive in Both Reading and Mathematics

AP-10 (variety of interactive instructional activities) is a positive predictor in both mathematics and reading. The negative predictors common to both subjects are WD-5 (variety of instructional materials) and AP-2 (inattentiveness).